

The Metaphysics of Grounding

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ABSTRACT

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The Metaphysics of Grounding

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The phrase ‘in virtue of’ is a mainstay of metaphysical discourse. In recent years, many philosophers have argued that we should understand this phrase, as metaphysicians use it, in terms of a concept of metaphysical dependence called ‘grounding’.

This dissertation explores a range of central issues in the theory of grounding. Chapter 1 introduces the intuitive concept of grounding and discusses some compulsory questions in the theory of grounding. Chapter 2 focusses on scepticism on grounding, according to which the recent philosophical interest in the topic is misguided. In chapter 3 I discuss grounding’s explanatory roles. Chapter 4 focusses on the claim that if an entity is grounded then it is an ontological free lunch. Chapter 5 discusses and rejects the claim that grounding is a relation between facts.

This conclusion raises a problem: if grounding is not a relation between facts it becomes difficult to specify the connections between grounding and explanation and grounding and necessity. But not only is it desirable to specify these relations, it is essential for establishing that grounding is able to play the explanatory roles that are discussed in chapter 3. Chapter 6 responds to this problem by outlining an approach to grounding based on David Lewis’s (2003) theory of truthmaking. Against this backdrop I discuss, in chapter 7, some issues in the logic of grounding.

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Chapter 1

Preliminaries

1.1 Introduction

The phrase ‘in virtue of’ is widely used in metaphysical discourse. So are similar expressions, including ‘depends on’, ‘determines’, ‘makes’ and ‘grounds’. To see the sort of metaphysical claim that these expressions are used to make, imagine a metaphysician making the following speech:

Fundamentally there are only atoms in the void. Macroscopic objects exist but they are *derivative* – they exist and have their features ultimately *in virtue of* the existence and features of the atoms. The atoms are *responsible for* everything else; they *make* the rest of reality the way it is. To adapt a metaphor of Saul Kripke’s (Kripke 1980: 153-4), if God wanted to create a duplicate of the actual world at time *t*, She only needs to duplicate the atoms and their arrangement at *t*. Having done this the rest would automatically follow, because the fundamental *determines* the non-fundamental.

The claims expressed by our imaginary metaphysician are of a familiar kind. How should they be understood? In particular, how should the italicised expressions be interpreted?

According to an approach that has become prominent recently, metaphysical usage of these expressions should be understood in terms of a distinctive concept of metaphysical determination called ‘grounding’. Grounding has been the subject of intense philosophical discussion in recent years (see Audi forthcoming a; forthcoming b; Correia 2005: ch. 3; 2010; Fine 2001; forthcoming a; Rosen 2010; Schaffer 2009; forthcoming). The debate is mostly very recent. Nonetheless, the theory of grounding is now established as a major concern of metaphysics.

The following two claims are popular among grounding theorists:

- The concept of grounding is distinctive, in that it resists analysis in terms of more familiar and better understood philosophical concepts (for example, grounding cannot be analysed in terms of supervenience).
- The concept of grounding is philosophically important, in that it plays serious explanatory roles in our theories (it is not a ‘mere placeholder’ or a ‘mere heuristic’).

Jonathan Schaffer succinctly articulates these claims by saying that “[g]rounding is an unanalyzable but needed notion – it is the primitive structuring conception of metaphysics” (Schaffer 2009: 364). Together they capture an enthusiastic view of grounding that many grounding theorists have, according to which grounding is both genuinely new and philosophically important.

I have two broad aims in this dissertation. The first is to support this enthusiastic view of grounding. This is the main task of the first half of the dissertation (chapters 2-4). It requires us to respond to various kinds of scepticism about grounding and to show that our metaphysical theories would be impoverished, in some important respects, by rejecting talk of grounding. I will try to show that this is indeed the case – that grounding plays some important explanatory roles in philosophical theories. By appealing to these roles I will argue that including claims of grounding in our theories is worth the costs to theoretical economy that are associated with doing so.

It will turn out that the case I present for believing in grounding has substantive commitments in the theory of grounding. My second broad aim is to extract a theory of grounding – or, at least, some important elements of a theory of grounding – from this case. This will be done in the latter half of the dissertation (chapters 5-7).

In the remainder of this introductory chapter I will set the stage for the subsequent discussion. I begin by introducing the intuitive concept of grounding – the core concept that the grounding debate starts with. As part of this, in section 1.2 I present some plausible examples of grounding. In section 1.3 I distinguish the concept of grounding from some other concepts with which it is easily confused. In section 1.4 I discuss the history of the contemporary debate about grounding. In section 1.5 I explain more carefully the enthusiastic view of grounding that I loosely characterized a moment ago. In section 1.6 I raise some compulsory questions in the theory of grounding. By delineating some of the available answers to these questions I hope to give an impression of the range of theories of grounding that are available. I close the chapter, in section 1.7, by explaining how the subsequent discussion will proceed.

1.2 The core concept

Following Gideon Rosen (2010: 110-3) and Jonathan Schaffer (2009: 375), we can introduce the core concept of grounding by citing plausible examples of it:

- (1) The brittleness of the cup results from the way its constituent atoms are arranged.
- (2) The truth-value of a proposition is determined by how the world is.
- (3) Actions have their moral properties in virtue of their non-moral properties.
- (4) Non-empty sets depend for their existence on their members.
- (5) A mental state is grounded in the brain state which realizes it.

Call claims like (1)-(5) ‘grounding claims’. Grounding claims are frequently made in philosophical discussions. The classic statement of claim (2) – the claim that truth is grounded by being – is due to Aristotle in the *Categories*:

[I]f there is a man, the statement whereby we say that there is a man is true ... And whereas the true statement is in no way the cause of the actual thing’s existence, the actual thing does seem in some way the cause of the statement’s being true: it is because the actual thing exists or does not that the statement is called true or false (Aristotle 1984: 22)

The analogy that Aristotle draws between grounding and causation is helpful. One way to approach the concept of grounding is by thinking of it as metaphysical determination, which is similar in some ways to causal determination – for instance, it bears a similar

connection to explanation (see also Fine forthcoming a: sect. 2; Schaffer forthcoming; we will return to the analogy between grounding and causation in chapter 2: sect. 2.5.1).

The intuition that truth is grounded by being is compelling. It drives the current debate about truthmaking. David Armstrong appeals to it when he asks the rhetorical question, “[m]ust there not be something about the world that makes it to be the case, that serves as an ontological ground, for this truth?” (Armstrong 1997: 115). Armstrong takes this intuition to point towards a version of truthmaker theory (see also Rodriguez-Pereyra 2005: sects. 6 and 7).

Claim (3) is defended by Jonathan Dancy, who says that “if an action has a moral property M , its M -ness results from some of its non-moral properties” (Dancy 1981: 367). Michael Fara, in a discussion of dispositional properties, claims that his vase “is fragile, it seems, in virtue of its irregular atomic structure, and in that sense the atomic structure of the vase grounds its fragility” (Fara 2006). And discussing the relation between aesthetic properties and non-aesthetic ones, Frank Sibley claims that,

aesthetic words apply ultimately because of, and aesthetic qualities ultimately depend upon, the presence of features which, like curving or angular lines, color contrasts, placing of masses, or speed of movement, are visible, audible, or otherwise discernible without any exercise of taste or sensibility (Sibley 1959: 424).

Grounding claims are not confined to philosophy. Much scientific effort is directed at finding the grounds of phenomena, such as the atomic basis of brittleness. And the language of grounding is sometimes used to express the thought that some facts, and some scientific disciplines, are more basic than other facts and scientific disciplines. As Jaegwon Kim notes,

[e]xpressions like “levels of description”, “levels of analysis”, “levels of explanation”, “levels of organization”, and “levels of complexity”, are commonly encountered – in fact, difficult to avoid – in scientific writings in various areas ... [Their use suggests] a certain overarching ontological picture of the world according to which the entities of the natural world are organized in an ascending hierarchy of levels (Kim 2002: 3).

The language of grounding is used in everyday discourse as well. It would not be unusual to hear somebody assert, in everyday parlance, that eating meat is wrong in virtue of causing unnecessary suffering (see Witmer et. al. 2005: 335-7).

Let us return to (1)-(5). As Rosen (2010: 110) emphasizes, we do not need to assert these examples in order for them to help introduce the concept of grounding. But we do need to claim (i) that they are meaningful and (ii) there is a core concept of dependence that they all (or a reasonable number of them) express.

Claim (i) is supported by linguistic evidence. Witmer et. al. (2005: 335-7) observe that,

[p]hilosophers and non-philosophers alike make use of “in virtue of” on a regular basis; there is, further, robust agreement on its proper use in philosophically uncontroversial contexts ... for instance, one has the right to vote in virtue of being an adult citizen, the responsibility to care for one’s children in virtue of being a parent, and the power to expel a student from school in virtue of being a high school principal (Witmer et. al. 2005: 336).

‘In virtue of’, as it is used in ordinary parlance, is intelligible. The same goes for similar expressions like ‘makes’ (e.g. ‘I might be lazy but that doesn’t make me stupid!’) and various other expressions for grounding as well (Witmer et. al. 2005: 336). If philosophers

use these expressions in the same way as ordinary speakers then their usage of these expressions is intelligible too (see chapter 2: sect. 2.5).

As we will see in chapter 2, there are sceptics about the intelligibility of grounding claims. But the intelligibility of ordinary usage of the language of grounding is not a promising target for scepticism. Those who deny that grounding claims are intelligible are most plausibly understood as denying the intelligibility of the interpretations given to these claims by certain grounding theorists. A grounding theorist maintains that (1)-(5) should be interpreted as involving a concept that has features F, G, \dots . The sceptic maintains that no intelligible concept has these features. So the sceptic maintains that the grounding theorist's concept of grounding is unintelligible. In this dialectic, the sceptic need not and should not deny the pre-theoretic intelligibility (1)-(5).

Consider now (ii). It is not to the point that (1)-(5) use different phrases to express grounding. These phrases are broadly interchangeable, and we could reformulate (1)-(5), without significantly changing their content, so that only one phrase is used for grounding:¹

- (1*) The brittleness of the cup is grounded by the way its constituent atoms are arranged.
- (2*) The truth-value of a proposition is grounded by how the world is.
- (3*) The moral properties of actions are grounded by their non-moral properties.
- (4*) Non-empty sets are grounded by their members.
- (5*) A mental state is grounded in the brain state which realizes it.

The view that 'is (are) grounded by' expresses a single concept of dependence in each of these claims seems to be a plausible default position. Is there any reason to reject it?

If a single phrase expresses different concepts in two different linguistic contexts, this is sometimes revealed when we consider elliptical constructions in which the contexts are conjoined and abbreviated so that a single occurrence of the phrase is made to do duty in both. For example, 'hard' is ambiguous. On one understanding it means *difficult*; on another it is a means something like *firm* or *unyielding*. This ambiguity is revealed by the dissonance we hear in the sentence:

(Hard) Playing the viola is hard and so is the diamond.

Following Jonathan Schaffer (Schaffer manuscript: sect. 1.4), we can apply this test to (1*)-(5*) by considering elliptical constructions like the following: 'sets are grounded in their members, as are mental states in their realizers and moral properties in non-moral properties'. As Schaffer observes, these constructions do not involve the kind of dissonance that (Hard) exhibits.

Sometimes we can detect meaning shifts by considering antonyms. The claim that *playing the viola is hard* is opposed to the claim that playing the viola is easy but it is not opposed to the claim that playing the viola is soft. By contrast, the claim that *the diamond is hard* is opposed to the claim that the diamond is soft but it is not opposed

¹'Is grounded by' is a predicate whereas 'in virtue of' is a hybrid expression that takes a sentence on its left and a singular term on its right. Syntactically these phrases are not interchangeable, because replacing either phrase in a well-formed sentence with the other invariably generates an ill-formed sentence. The sense in which they are broadly interchangeable is a semantic sense: they mean approximately the same thing.

to the claim that the diamond is easy. The fact that different and unrelated antonyms of ‘hard’ are used to oppose the italicised claims shows that ‘hard’ is used differently in them.

With this in mind, consider the following generalisations of (1*)-(5*), where a thing is grounded if and only if there is something that grounds it:

(1+) The brittleness of the cup IS GROUNDED.

(2+) The truth-value of a proposition IS GROUNDED.

(3+) The moral properties actions ARE GROUNDED.

(4+) Non-empty sets ARE GROUNDED.

(5+) A mental state IS GROUNDED.

How do we negate these claims (laying aside the simple move of adding the operator ‘ \sim ’ at the start of them)? If different and unrelated antonyms of ‘is grounded’ are used to negate these claims then, it would seem, ‘is grounded’ expresses different concepts as it figures in them. In fact, the opposite is true. These claims are all negated by replacing the capitalised clauses with the predicate ‘is fundamental’ (we might also use the predicate ‘is brute’ to the same effect).

Since these two tests for meaning shifts are met, it is reasonable to proceed on the assumption that claims (1)-(5) involve a single concept of dependence. I stress that I am concerned at present with the intuitive concept of grounding – the concept that ordinary speakers express with ‘in virtue of’. It seems reasonable to think that, prior to developments in the theory of grounding, philosophers who use ‘in virtue of’ do so in the same way as the folk (in many cases at least) even though they tend to use the concept in more theoretical contexts. Some grounding theorists might claim that (1)-(5) should be interpreted as expressing different concepts of grounding. But such philosophers are best interpreted as introducing ambiguity and fine-grained distinctions into the discourse – it is not plausible that (1)-(5), interpreted pre-theoretically, express different concepts of dependence.

1.3 Contrasts

In ordinary and philosophical discourse, the language of grounding can be used to express a variety of distinct concepts.² These distinctions are easily overlooked and it is crucial that we make them explicit.

1.3.1 Explanatory vs. evidential uses of ‘grounds’

The first distinction is between explanatory and evidential use of the language of grounding. (1)-(5) show that grounding is closely related to explanation. It seems to be a consequence of (1) that we can explain why the cup is brittle by citing its atomic structure; of (2) that we can explain why a particular proposition is true by pointing out how the world is in the relevant respect; and so on. ‘In virtue of’ and its cognates are, broadly speaking, explanatory locutions.

It is important to distinguish explanatory uses of ‘in virtue of’, ‘grounds’, ‘makes’ etc. from any evidential uses that these expressions have. It is clear that ‘grounds’ is sometimes used evidentially: ‘On what grounds do you make these allegations?’ is a

²This is not to say that this happens in (1)-(5), as they are intended.

request for the evidence that you have for thinking the allegations true. ‘Because’ also has evidential uses. Compare, ‘Jones is out because his car is not on the drive’ with ‘Jones went out because he needed fresh air’. In the former sentence, it is most natural to understand ‘because’ evidentially – the absence of the car is evidence that Jones has gone out. In the latter sentence, ‘because’ is more naturally understood explanatorily: Jones’s desire for fresh air explains why he is out.

This explanatory/evidential ambiguity pervades our explanatory language. It is crucial to be clear that grounding is an explanatory, not an evidential, concept. We must not be distracted by the fact that some of the expressions we use to express the concept of grounding also have evidential usages. (On the explanatoriness of grounding, see Audi forthcoming a; forthcoming b; Fine forthcoming a: sect. 2; Rosen 2010: 116; Trogon forthcoming: sect. 2. On the evidential use of ‘because’, see Hempel 1965: 364-5; Morreall 1979).

Another important point to make is that the kind of explanation at issue here is *objective* explanation. Whether some claim or fact explains another in the objective sense does not depend on the interests or epistemic makeup of enquirers. It is plausible that some explanations are objective like this (Hempel 1965: 426). Consider causal explanations. Suppose that every event has the Big Bang as a causal ancestor. On this supposition, there is a clearly a sense in which the Big Bang explains all subsequent events. It does not matter that it would be inappropriate or unhelpful to cite the Big Bang in most explanatory contexts – when explaining why, for instance, the fridge is broken. Nor would it matter if nobody ever knew or cared about the Big Bang. It would still have happened and it would still explain all subsequent events, in the objective sense of ‘explains’.

The non-causal explanations associated with grounding are also objective. If macroscopic facts are grounded by microscopic ones then we can explain why any given macroscopic fact obtains at a time t in terms of facts about the relevant microscopic particles at t . This is so even if nobody ever knows or cares about the particles and even if nobody ever asks a question in answer to which it would be appropriate to cite facts about the particles.

It is controversial whether explanation is ever objective like this (see van Fraassen 1980: ch. 5). But this is not a controversy that I will engage with here. The claim that some explanations are objective is a great deal less contentious than the claim that some things ground others. None of the questions we will discuss are begged by assuming that some explanations are objective.

1.3.2 Contrast with causation

Grounding is not causation. None of (1)–(5) is plausible if understood causally: a cup’s being brittle is not caused by the arrangement of its atoms and sets are not caused to exist by their members. Grounding is a non-causal kind of determination.

One reason for denying that (1)–(5) involve causal determination is modal. It is plausible that causation is a metaphysically contingent relation, in the sense that where some event e_1 causes an event e_2 , it is always the case that e_1 could have occurred without e_2 occurring. Causal relations are subject to causal laws. But the causal laws seem to be contingent: it seems that the world could have been governed by different causal laws or perhaps none at all (although see Shoemaker 1980). By contrast, (1)–(5) seem non-contingent: it seems that if the facts cited on the right of these claims obtain then the facts on the left must obtain as well (Kim 1974: 42-3; Rosen 2010: sect. 7). For instance, it seems to be a consequence of (1) that the arrangement of the atoms necessitates the brittleness of the cup and of (2) that the nature of the world necessitates the distribution of truth-values over propositions.

Another reason to deny that (1)-(5) involve causation is that causation is naturally thought of as a diachronic relation: it seems that causes temporally precede their effects. But none of (1)-(5) exhibit this temporal asymmetry. The brittleness of the cup does not come after the arrangement of the atoms, for instance.

It is not obvious whether, in ordinary discourse, we distinguish between causal and non-causal dependence. It could be that we ordinarily understand (1)-(5) as expressing a catch-all concept of dependence that includes causal and non-causal cases. It seems we *can* read (1)-(5) as employing such a concept: the sentence ‘sets depend on their members, as do causes on their effects’ imposes such a reading. But this catch-all concept is not at issue in the grounding debate. Grounding theorists take ‘grounding’ to express a specifically non-causal kind of dependence. If the closest thing in our ordinary conceptual scheme is the catch-all concept of dependence then participants in the debate need to give ‘grounding’ a technical meaning. The linguistic evidence described in section 1.2 of this chapter would then not support the meaningfulness or univocality of ‘grounding’ as it figures in the grounding debate (issues like this will arise again in chapter 2: sect. 2.5).

1.3.3 Contrast with conceptual priority

Grounding also contrasts with notions of conceptual priority (see Liggins forthcoming). We can try to isolate such notions with the slogan: ‘priority in the order of understanding’. It seems natural to say that the concepts of being a sibling and being male are conceptually prior to the concept of being a brother (for relevant discussion, see Dodd 2007: 400-1; Künné 2003: 155; 338 fn. 70; Schnieder 2006a: sect. 5; 2010).

The concept of conceptual priority is poorly understood. But it seems likely that, on any reasonable construal of this notion, relations of conceptual priority are always a priori knowable. If this is correct then grounding is not the same as conceptual priority, since relations of grounding are not always a priori knowable. Finding out the grounds for a cup’s brittleness, for example, is an a posteriori matter. In general, grounding is best construed as a metaphysical, rather than a conceptual, kind of dependence. The claim that *F*’s ground *G*’s does not seem to imply any claims about the concepts of *F* or *G*. It does not imply, for instance, that the only epistemic access we have to the concept of a *G* is via the concept of an *F*. Nor does it imply that the concept *G* can be analyzed in terms of the concept *F*.

1.3.4 Contrast with modal concepts

It might be suggested that the intuitive concept of grounding can be captured in modal terms. In this section we will see that modal analyses of grounding face serious difficulties. We will consider a hopefully representative sample of modal analyses and find that none of them capture the intuitive concept of grounding (the difficulties with modal analyses of grounding and dependence are well documented. See Fine 1995; Kim 1974; 1993: 167; McLaughlin and Bennett 2005: sect. 3.5; Raven 2011: sect. 3.1; Rosen 2010: 113-4; Schaffer 2009: 364; manuscript: sect. 2. For related discussion in the truthmaking debate, see Daly 2005: sect. 4; Gregory 2001; Restall 1996; Rodriguez-Pereyra 2006).

A very simple proposal for analyzing grounding is the following:

x is grounded by $y \leftrightarrow_{def}$ it is metaphysically necessary that if y exists then x exists.

Say that a truth is metaphysically necessary if and only if it is absolutely impossible that that it be false – there is, unrestrictedly, no possible world in which a metaphysically necessary truth fails to be true. I frame the proposed analysis in terms of metaphysical necessity, rather than any other sort of necessity, because it seems to be the modality

relevant for grounding claims (we could leave the modality contextually variable, to allow that it differs in different cases; doing this would not affect the substance of our discussion).

This analysis is not general enough, in two respects. Firstly, it only allows a single entity to be grounded by another single entity. We might want to allow grounding involving pluralities of entities – for instance, we might say that the set containing Socrates and Plato is grounded by Socrates and Plato together. Secondly the proposal is centered on existence, whereas some intuitive cases of grounding concern a thing’s properties rather than its existence. According to example (1) the cup’s *brittleness* is grounded by the properties of its parts. But the proposed analysis seems designed for claims to the effect that a thing’s *existence* is grounded by that of another thing.

One way to remedy these deficiencies is to invoke facts or states of affairs as the relata of grounding. I will use singular terms of the form ‘ $[p]$ ’ to denote facts, where ‘ p ’ stands in for a declarative sentence and the square brackets ‘ $[\dots]$ ’ abbreviate the sentence nominalising functor ‘the fact that...’. ‘ $[p]$ ’ is to be read: the fact that p . Now consider the amended analysis:

- (6) For any facts $[p]$ and $[q]$, $[p]$ is grounded by $[q]$ \leftrightarrow_{def} it is metaphysically necessary that if $[q]$ obtains then $[p]$ obtains.

We should take the domain of quantification here to only include actually obtaining facts, to avoid commitment to certain implausible grounding claims. For instance, it is not the case that [Grass is coloured] is grounded by [Grass is purple], even though it is metaphysically necessary that if [Grass is purple] obtains then [Grass is coloured] obtains. And it is not the case that metaphysically impossible facts, like [Squares have five sides], ground all facts, even though it is metaphysically necessary that if [Squares have five sides] obtains then any fact at all obtains (conditional statements with impossible antecedents are trivially true, on the usual semantics for them).

(6) is not restricted to existence facts and so accommodates examples like (1). And if we admit facts containing more than one individual, it allows that facts involving pluralities of entities can ground and be grounded. For instance, it allows that [The set containing Socrates and Plato exists] is grounded by [Socrates and Plato exist].³

The left to right direction of (6) is not obviously problematic and may be plausible (for defence, see Rosen 2010: 118). But the right to left direction is very implausible. An initial problem is that the analysis implies that grounding is a reflexive relation, since for any fact $[p]$ it is metaphysically necessary that if $[p]$ obtains then $[p]$ obtains. But this is very implausible – it does not seem that [Big Ben is tall] is grounded by [Big Ben is tall], for example (see Schaffer manuscript: sect. 2; Raven 2011: sect. 3.1).

This defect in (6) can be fixed by adding a clause to the effect that the facts involved must be distinct, as in (6*):

- (6*) $[p]$ is grounded by $[q]$ \leftrightarrow_{def} it is metaphysically necessary that if $[q]$ obtains then $[p]$ obtains and $[p]$ and $[q]$ are distinct.

(6*) entails that there are no facts that ground themselves. This is a popular claim (see Audi forthcoming a: sect. 6; Rosen 2010: 115; Schaffer 2009: 376). But it is not beyond reasonable doubt and we might not want an analysis of grounding to imply it (for critical discussion see Jenkins 2011; and below chapter 7: sect. 7.6).

In any case, serious problems remain. (6*) implies that any fact that obtains of metaphysical necessity is grounded by every fact. Suppose that [The number three is

³We will discuss and reject the claim that grounding is a relation between facts in chapter 5. For now we can just pretend, for ease of presentation, that grounding claims have the form ‘ $[p]$ is grounded by $[q]$ ’. Note also that even if grounding is a relation between facts, it might not be one-one; see Rosen 2010: 115. I ignore this complication for simplicity.

odd] obtains of metaphysical necessity. On this supposition, any fact at all is such that it is metaphysically necessary that if it obtains, [The number three is odd] also obtains. By the right to left direction of (6), this means that [The number three] is odd is grounded by any and every fact (except itself). But this is very implausible. [The number three is odd] is not, for instance, grounded by [Big Ben is tall]. Grounding is explanatory (sect. 1.3) and it does not seem that we can explain why three is odd by citing Big Ben's tallness (Schaffer manuscript: sect. 2. Restall 1996: 334 discusses a closely related problem that arises for certain versions of truthmaker theory).

Furthermore, (6*) implies that any fact $[p]$ is grounded by all (actually obtaining) conjunctive facts which have p as a conjunct. This is because it is metaphysically necessary that if $[p$ and $q \dots]$ obtains then $[p]$ obtains. But this seems very implausible (Correia 2005: sect. 3.1. Compare Hempel 1965: 337). It does not seem that [The cup is brittle] is grounded by [The cup is brittle and Big Ben is tall], for instance.

Say that any facts $[p]$ and $[q]$ are intensionally equivalent if and only if it is metaphysically necessary that $[p]$ obtains if and only if $[q]$ obtains. (6*) implies that for any facts $[p]$ and $[q]$, if $[p]$ and $[q]$ are intensionally equivalent then $[p]$ is grounded by $[q]$ and $[q]$ is grounded by $[p]$. But this is very implausible – it seems that explanatory asymmetries can obtain between intensionally equivalent facts. This seems to be Aristotle's point in the following passage:

[I]f there is a man, the statement whereby we say that there is a man is true, and reciprocally And whereas the true statement is in no way the cause of the actual thing's existence, the actual thing does seem in some way the cause of the statement's being true (Aristotle 1984: 22, emphasis added).

Aristotle's intuition is very compelling. It seems plausible that [The proposition that Kripke exists is true] is grounded by [Kripke exists] but not vice versa. According to (6*), however, there is no asymmetry here because the grounding claim involves intensionally equivalent facts. (6*) is unable to accommodate asymmetrical relations of grounding between intensionally equivalent facts.

Consider also Kit Fine's celebrated example of Socrates and the singleton set that contains him. In what follows I will sometimes denote sets using the curly brackets: '{ }'. For instance, the singleton set containing Socrates is denoted with the following term: '{Socrates}'.

Given plausible assumptions, the following is metaphysically necessary: Socrates exists if and only if {Socrates} exists. So it is plausible that [Socrates exists] and [{Socrates} exists] are intensionally equivalent. Yet it is plausible that there remains an explanatory asymmetry: one can explain the existence of Socrates's singleton set by citing the existence of Socrates, but cannot explain the existence of Socrates by citing the existence of the singleton set (Fine 1995: 271-2; Kim: 1974: 43 outlines a similar example not involving sets).

The upshot is that (6*) does not capture the intuitive content of grounding claims. Nor do similar analyses in terms of counterfactuals or concepts of supervenience. Consider a simple analysis in terms of counterfactuals:

(7) $[p]$ is grounded by $[q]$ \leftrightarrow_{def} if $[q]$ had not obtained then $[p]$ would not have obtained.

The standard possible worlds semantics for counterfactual conditionals implies that counterfactual conditionals with impossible antecedents are vacuously true (Lewis 1973). As a result, (7) implies that necessarily obtaining facts ground all other facts (Schaffer manuscript: sect. 2.1). For it is vacuously true that if a necessarily obtaining fact did not obtain then any fact at all would not have obtained. But it is very implausible, for example, that [Kripke is a philosopher] is grounded by [The number three is odd].

(7) also has problems with intensionally equivalent facts (Schaffer manuscript: sect. 2.2). For in such cases, counterfactual dependence is symmetrical: if [The proposition that grass is green is true] had not obtained then [Grass is green] would not have obtained *and vice versa*, since it is metaphysically necessary that [The proposition that grass is green is true] obtains if and only if [Grass is green] obtains. But it is not plausible that there is mutual grounding between these facts.

These considerations also undermine the idea that grounding can be understood in terms of supervenience. The supervenience relations are a family of modal relations (McLaughlin and Bennett 2005: sect. 4 provide an overview). Speaking roughly, to allow for family differences, if something supervenes on something else then the former thing could not have been different without some corresponding difference in the latter. David Lewis summarizes the central idea of supervenience with the slogan: “[s]upervenience means that there could be no difference of one sort without difference of the other sort” (Lewis 1986: 15).

There is an extensive literature on supervenience. We do not need to discuss all of the possible supervenience-based analyses in order to see that the problems we have seen are bound to afflict them. The basic problem is that supervenience relations are intensional while grounding is not. Treating supervenience as a relation between facts and where Γ and Δ are classes of facts: If $[p]$, Γ supervene on $[q]$, Δ and $[p]$ is intensionally equivalent with $[s]$ and $[q]$ is intensionally equivalent with $[r]$, then $[s]$, Γ supervene on $[r]$, Δ . But grounding is not like this: the example of Socrates and his singleton set shows that we cannot preserve the truth of grounding claims by substitution of intensionally equivalent facts. It is therefore unclear how we can understand grounding in terms of supervenience.⁴

1.4 A brief history of grounding

It is arguable that the concept of grounding has featured in philosophical discussions since antiquity. Jonathan Schaffer (2009: 375) detects the concept of grounding in Plato’s *Euthyphro* question, “Is what is holy holy because the gods approve it, or do they approve it because it is holy?” (Plato 1961: 178). Schaffer (2009: sect. 1.2) also claims that Aristotle conceived of metaphysics as centred on the question ‘What grounds what?’, since the concept of grounding is intimately connected to the Aristotelian concept of substance (for the connection between grounding and substance, see also Schnieder 2006b). We saw above (sect. 1.2) that Aristotle endorsed the claim that truth is grounded by being. In *Discourse on Metaphysics* (sect. 8), Leibniz voices the same intuition, claiming that “it is evident that every true predication has some *basis* in the nature of things” (Leibniz 2008: 13, my emphasis).

Despite its seemingly long history, sustained and systematic discussion of grounding is – with a couple of exceptions – a very recent phenomenon. In 1837 Bernard Bolzano commented on the lack of extensive discussion of grounding and, while he did not reverse this historical trend, his discussion of grounding (*Abfolge*) is a salutary exception to it (Bolzano 1972: 272; see Tatzel 2002 for a helpful explication of Bolzano’s theory).⁵ An-

⁴Philip Bricker 2006: sect. 5 argues that grounding can be understood in terms of supervenience plus Lewis’s notion of naturalness. It will not be a significant distortion, in this context, to take the natural facts to be exactly those described by the theories of fundamental physics. Bricker’s proposal is that some facts are grounded by others if and only if the former supervene on the latter and the latter are perfectly natural. Two comments: (i) this is no longer a purely modal analysis of grounding, so it does not threaten the point made in the text. (ii) Schaffer manuscript: sect. 3.2 points out that analyzing grounding in terms of the concept of naturalness makes accounting for grounding between non-natural facts problematic. It seems, for instance, that [The set containing Plato and Socrates exists] is grounded by [Socrates and Plato exist], even though this latter fact is not perfectly natural.

⁵Strictly speaking, the examples given in Bolzano 1973: 246 show that Bolzano is concerned with a broader explanatory notion than that of grounding, since his examples include both causal and non-causal

other important early grounding theorist is Edmund Husserl, whose concept of foundation is similar to the contemporary concept of grounding (Husserl 2001: sect. 14; see Correia 2004 for discussion).

More recent precursors to the current debate include Kit Fine, whose example involving Socrates and his singleton set (discussed in sect. 1.3) has been particularly influential (Fine 1995: 271–2). In addition, Jaegwon Kim (1974; 1994), E. J. Lowe (1994), Kevin Mulligan et al. (1984), and David-Hillel Ruben (1990: ch. 7) are important forerunners of the current debate.

One reason for the current explosion of interest in grounding is that, in recent years, work in various philosophical debates has converged on the notion of grounding. For instance, the theory that everything is fundamentally physical turns out to be hard to capture using the notion of supervenience (see Stoljar 2009: section 4, for an overview). Perhaps it should be understood as the claim that everything is *grounded* in the physical. Another example is truthmaker theory. The claim that an entity makes a proposition true just in case it is impossible for it to exist without the proposition being true is very implausible, for it has the implausible consequence that any proposition which is necessarily true is made true by each entity that exists (Restall 1996: 333–4). More sophisticated attempts to explain truthmaking in modal terms run into difficulties too, which suggests that ‘more finely-honed tools’ (Gregory 2001: 427) are required. Perhaps we should say that an entity makes a proposition true just in case it is true in virtue of that entity (see e.g. Rodriguez-Pereyra 2006: 960).

Important contributions to the debate have recently been made by Paul Audi (forthcoming a; forthcoming b), Fabrice Correia (2005; 2010), Kit Fine (2001; 2010; forthcoming a; forthcoming b), Gideon Rosen (2010), Jonathan Schaffer (2009; forthcoming; manuscript) and Benjamin Schnieder (2010).

1.5 Enthusiasm

In section 1.1 I said that many grounding theorists think that grounding is *distinctive* and *philosophically important*. This is a loose characterization of a view that I will call ‘enthusiasm about grounding’ or ‘enthusiasm’ for short.

More carefully, enthusiasm can be given either a conceptual or a metaphysical spin:

Enthusiasm_C: The concept of grounding is irreducible to other concepts (like modal concepts or logical concepts); of great philosophical importance; so should be adopted as a conceptual primitive.

Enthusiasm_M: The relation of grounding is sui generis – i.e. not identical with relations we independently postulate, like supervenience relations; of great philosophical importance; so should be included in our ontology.

Enthusiasm_C and Enthusiasm_M are logically independent: neither claim implies the other, without special assumptions. Some grounding theorists defend both of these claims (Audi forthcoming a; forthcoming b; Rosen 2010; Schaffer 2009; manuscript) and others defend only the first (Correia 2010; Fine forthcoming a). Nobody, as far as I know, has defended just the second claim, although this is a position that I am tempted by (see chapter 2: sect. 2.5.2). In what follows, if I use ‘enthusiasm’ without qualification, I mean the disjunction of enthusiasm_C and enthusiasm_M.

Opposed to enthusiasm is ‘scepticism about grounding’, or ‘scepticism’ for short:

cases. Bolzano is concerned with a relation allegedly expressed by ‘because’, as this word occurs in both causal and non-causal explanations. The current debate, by contrast, focuses on a specifically non-causal concept. Bolzano’s concept is, however, similar enough to the concept of grounding to consider him a forerunner to the current debate.

Scepticism: Neither (Enthusiasm_C) nor (Enthusiasm_M) is true.

Chris Daly (forthcoming) and Thomas Hofweber (2009) provide the most detailed defences of scepticism to date. More casual expressions of scepticism are made by David Lewis (1983: 358), Alex Oliver (1996: 48) and Timothy Williamson (2007: 59). My sense is that scepticism is widespread among philosophers at large, although it is more often encountered in conversation than in print.

For the rest of this chapter I will lay scepticism aside to focus on enthusiasm (scepticism will be the focus of chapter 2). Among those engaged in the grounding debate, enthusiasm is probably the dominant view and it seems to be becoming increasingly popular. Enthusiasm inevitably involves some cost to theoretical economy – either conceptual economy or ontological economy or both. Defending enthusiasm_C involves introducing a new primitive concept and enthusiasm_M requires us to introduce a new relation into our ontology. We need to know why we should bear these theoretical costs: in what way would our theory be impoverished if we eliminated grounding claims or (re)interpreted them in terms of something else? What is grounding *for*?

Corresponding to the distinction between Enthusiasm_C and Enthusiasm_M is a distinction between different sorts of theoretical role that enthusiasts might cite to establish grounding's utility. Enthusiasts might defend their view by citing *conceptual roles* played by the concept of grounding and also by citing *ontological roles* played by the grounding relation.

We specify grounding's conceptual roles by specifying the connections that obtain between the concept of grounding and other concepts. Enthusiasts often claim that the concept of grounding has a role to play in various conceptual analyses and in framing various philosophical claims: claims about truthmaking (Rodriguez-Pereyra 2005: sect. 4), physicalism (Loewer 2001: 39), the intrinsic-extrinsic distinction (Rosen 2010: 112) and about the nature of ontology (Fine 2001; Schaffer 2009). Enthusiasm might be justified by arguing that talk of grounding sheds light on these topics.

Defenders of enthusiasm_C are not committed to giving *any* account of the ontological roles of the grounding relation, since enthusiasm_C does not imply the existence of the grounding relation. But if we endorse enthusiasm_M we need to give an account of the explanatory work done by the grounding relation. There are at least three ontological roles that grounding relations might play (these are discussed further in chapter 3). First, grounding relations might be introduced in the context of 'explanatory realism'. Explanatory realism is a theory of explanation according to which explanations are underpinned by worldly determination relations. According to explanatory realism, these relations are the ontological correlates of explanations (Audi forthcoming a: sect. 3; Kim 1994; Rodriguez-Pereyra 2005: 28; Ruben 1990: ch. 7. I discuss explanatory realism further in chapters 3: sect. 3.2 and chapter 5: sect. 5.4).

Second, grounding relations might be introduced to explain similarities that obtain between a class of metaphysical relations that I will label the 'determination relations'. The determination relations include the mereological summation relation, the set membership relation, the realization relation, the truthmaking relation, among others.⁶ Intuitively, these are all dependence relations – mereological sums plausibly depend on their parts, singleton sets plausibly depend on their members, and psychological states plausibly depend on their physical realizers. Why is this the case? One explanatory proposal is to appeal to a generic dependence relation – the grounding relation – of which all of these relations are specific versions.⁷ In this capacity, the grounding relation is postulated to explain the similarities between the determination relations (see Audi forthcoming b: sect. 1).

⁶I use 'determination relation' roughly as Bennett 2011a uses 'building relation'.

⁷'Version' is deliberately vague. We will consider the matter more fully in chapter 3 sect 3.3.

A third explanatory role for grounding relations is in explaining supervenience relations. If some class of properties supervenes on another, it is very natural to seek an explanation of this fact. Grounding relations provide candidate explanations for certain supervenience theses (see chapter 3 sect. 3.4). Jonathan Schaffer thinks that grounding relations explain supervenience relations, claiming that “the supervenience correlation . . . should be explained via grounding” (Schaffer 2009: 364). Jaegwon Kim also suggests this role for grounding, in the following comments:

Supervenience itself is not an explanatory relation. It is not a “deep” metaphysical relation; rather, it is a “surface” relation that reports a pattern of property covariation, suggesting the presence of an interesting dependency relation that might explain it (Kim 1993: 167).⁸

Our account of grounding’s roles will inevitably influence the theory of grounding we ultimately arrive at. Conversely, particular commitments in the theory of grounding might influence what theoretical roles grounding can play. We will keep referring back to the question of grounding’s roles as we consider, in the next section, some central questions in the theory of grounding.

Before turning to these questions, there is a dialectical issue to clarify. Distinguish the *descriptive* from the *prescriptive* approach to the theory of grounding. The descriptive approach aims to clarify what grounding claims *in fact* mean and descriptivists address further conceptual and metaphysical questions on the assumption that grounding claims are so interpreted. Prescriptivists aim to clarify what grounding claims *should be taken to mean* and further conceptual and metaphysical issues are discussed on this assumption (for an analogous distinction between fictionalist theories of mathematics, see Burgess and Rosen 1997: 6).

Note that descriptivists and prescriptivists are distinguished by their aims and not their results. Their theories might end up being just the same. Note also that descriptive considerations about how grounding is in fact used may bear upon the normative question of how it ought to be. One might argue that we *should* reject grounding claims because they are *in fact* unintelligible. I am not saying this is plausible, but it illustrates how a descriptive thesis might bear on a prescriptive one.

How should we approach the theory of grounding? I do not claim that the descriptive approach is without interest. But my focus here is on the debate among prescriptivists. Participants in the recent debate do not just say that grounding in fact figures in our theories but that it *should* so figure – this is the upshot of both enthusiasm_C and enthusiasm_M. This is a much stronger and philosophically more interesting claim than the descriptive claim that we in fact do believe in a distinctive concept or relation of grounding.

The philosophically important debate between enthusiasts and sceptics is a debate among prescriptivists. Enthusiasts tell us that grounding claims are important enough to *warrant* inclusion in our theories while sceptics argue that grounding claims *should* either be rejected or (re)interpreted in terms of quotidian concepts. This is the debate that I want to engage with and so I will conduct the discussion assuming prescriptivism: when I speak of a theory of grounding, I mean a theory of how grounding claims should be interpreted.

⁸Note that Kim tends to speak about dependence in the plural and it is not clear whether he is willing to postulate a generic relation of grounding in addition to the more specific dependence relations that he discusses. See, e.g., Kim 1994: 67.

1.6 Questions

1.6.1 Technical or ordinary?

It is easy to overlook the question: Is the concept of grounding used in ordinary discourse or is it a technical concept of philosophical theories? We saw above that the language of grounding is meaningfully used in everyday discourse. But it is not obvious that enthusiasts use this language in the ordinary way. Nor is it obvious that the intuitive concept expressed by ordinary usage of ‘in virtue of’ will vindicate enthusiasm – it may be that the ordinary concept of grounding is too thin to bear the weight that enthusiasts put on it.

There is no consensus on this question. Witmer et. al. use ‘grounding’, and similar terms, to express a non-technical concept (Witmer et. al 2005: 336-7). Similarly, Jonathan Schaffer describes grounding as “intuitive and natural” (Schaffer 2009: 375). By contrast, Thomas Hofweber claims that,

[t]hese notions of metaphysical priority [including grounding] usually get terms that are very familiar from ordinary discourse, but are supposed to have a distinctly metaphysical meaning (Hofweber 2009: 268).

The claim that grounding is a technical concept of metaphysical theories is naturally allied with scepticism about the intelligibility of the concept, as it is in Hofweber’s case. But there is no reason that an enthusiast should not endorse the view that grounding is a technical concept (this is my view; see chapter 2 sect. 2.5). The question to ask is whether any ordinary concept will bear the theoretical burden that enthusiasts put on it. If not, then enthusiasts should introduce a technical concept to play grounding’s theoretical roles instead.

1.6.2 How should grounding claims be regimented?

The central question about the regimentation of grounding claims is this: What sort of expression should we use to express grounding? A survey of the English expressions used in examples (1)-(5) above suggests three ways of regimenting grounding claims: the *predicate theory*, according to which grounding should be expressed using a predicate, such as ‘depends on’ or ‘grounds’; the *connective theory*, according to which grounding should be expressed with a (non truth-functional) sentential connective, such as ‘because’; and the *mixed theory*, according to which grounding should be expressed with a locution such as ‘in virtue of’, which takes a sentence and a singular term.

The mixed theory has proved unpopular. One problem with the mixed theory is that it makes discussing the logic of grounding awkward. To illustrate, there should be a substantive question about whether anything grounds itself – that is, whether grounding is irreflexive. But it is difficult to discuss this question on the mixed theory. Suppose that grounding claims have the form:

p in virtue of x

where ‘ p ’ is replaced, in substitution instances of this schema, by a sentence and ‘ x ’ by a singular term. The claim that grounding is irreflexive cannot sensibly be construed as the claim that all instances of the following schema are true:

$\sim (p$ in virtue of x and x in virtue of $p)$

Substitution instances of this schema are ill-formed, because ‘in virtue of’ takes a sentence on the left and a singular term on the right. So the question of whether grounding is irreflexive cannot be construed as a debate about the whether all instances of the above

claim are true, since they are trivially not true (ungrammatical sentences cannot be true). The wider problem is how we can articulate the idea that grounding is irreflexive, on the proposed regimentation. Similar problems arise if we try to discuss whether grounding is transitive or asymmetric as well. Because of these problems, I will lay the mixed theory aside in what follows.

Our choice between predicate and connective theory bears on our metaphysical account of grounding. For it is standard to think that predicates pick out relations. If so, the predicate theory entails that grounding claims imply the existence of grounding relations and their relata. This does not seem to apply to the connective theory, for sentential connectives ('and' and 'if...then...', for example) are not generally taken to pick out relations. This is why friends of the connective theory sometimes claim that considerations of ontological neutrality favour their view (Correia 2010: sect. 1.1 and Fine forthcoming b: sect. 4). Fine, for instance, claims that

[i]t would be better if, in formulating such statements, we could avoid the commitment to propositions or facts or the like and the embarrassment over saying what they are. And such neutrality is best achieved – and perhaps can only be achieved – by using an operator in place of a predicate (Fine forthcoming a: sect. 4)

I will make two comments on this. Firstly, the connective theory might have controversial ontological commitments that show up elsewhere in the theory. It is notable that the formal semantic theories of grounding which Fine (forthcoming a: sect. 3) and Correia (2010: sect. 7) develop to study the properties of their formal theories of grounding involve quantification over facts. If the ontological neutrality of the connective theory is to be preserved, then these semantic theories will have to be treated as either not being ontologically committal to facts or failing to reveal the truth conditions of grounding claims (as noted by Correia 2010: sect. 7). Secondly, one might question the desirability of ontological neutrality in the theory of grounding. Ontological neutrality is desirable if your project is to provide a neutral framework in which theorists of different persuasions can make grounding claims. But not all grounding theorists have this agenda. In particular, if you endorse enthusiasm_M then you are unlikely to think that ontological neutrality is a desideratum for theories of grounding. For example, explanatory realism, as defended by Kim (1994) and Ruben (1990: ch 7), claims that explanations track worldly determination relations such as causation. Presumably explanatory realists look to the theory of grounding to explain the nature of non-causal determination relations, in which case they will not be in the market for an ontologically neutral theory. The dispute between predicate theorists and connective theorists in part turns on the prior question of what grounding talk is for. I will take up questions of regimentation in chapter 6, where I defend a version of the predicate view. It is worth noting here that the regimentation I propose for grounding is motivated by a metaphysical account of grounding (to be defended in chapter 5) and not by the desire for ontological neutrality.

1.6.3 What is the logic of grounding?

Following Fine (forthcoming a: sect. 6; see also Fine forthcoming b) we can distinguish between the 'pure' and the 'impure' logic of grounding. The pure logic of grounding investigates the logical relations between grounding claims. The impure logic of grounding, by contrast, investigates the relations between grounding and logical notions such as the truth-functional connectives and the quantifiers.

For illustrative purposes, in this section I will continue to take grounding to be a relation between facts but I will no longer take this relation to be one-one. Those who

endorse different frameworks must discuss these logical issues in different terms (Schnieder 2010: sect. b explains how connective theorists can discuss some of these issues).

Begin with the pure logic of grounding. We saw in sect. 1.3.4 that grounding seems to be *hyperintensional*. If $[p]$ is grounded by $[q]$ it does not follow that $[p]$ is grounded by any fact that is intensionally equivalent to $[q]$. In addition, grounding seems to be *non-monotonic*, in that if $[p]$ is grounded by $[q]$ it does not follow that $[p]$ is grounded by $[q]$ and any other fact $[r]$ (Rosen 2010: 116; Schaffer manuscript: sect. 1.2). Explanatory relations tend to be non-monotonic: that Big Ben’s mass is explained in terms of the masses of its constituent molecules does not imply that we can explain it in terms of the masses of the molecules and facts about the state of the economy. There seems to be a relevance requirement on explanations that rules out expansions like this.

Transitivity can be understood as the claim that, for all $[p]$, $[q]$ and $[r]$, if $[p]$ is grounded by $[q]$ and $[q]$ is grounded by $[r]$ then $[p]$ is grounded by $[r]$ (Rosen 2010: 116; Schaffer 2009: 376). *Irreflexivity* is the claim that nothing grounds itself – that is, there is no fact $[p]$ such that $[p]$ is grounded by $[p]$ (Audi forthcoming a: sect. 6; Rosen 2010: 115; Schaffer 2009: 376). And *asymmetry* can be understood as the claim that there is no mutual grounding – there are no facts $[p]$ and $[q]$ such that $[p]$ is grounded by $[q]$ and $[q]$ is grounded by $[p]$. These claims are prima facie plausible. But note that irreflexivity, transitivity and asymmetry are properties of binary relations. If grounding turns out to be anything other than a binary relation then it would seem that these properties are not applicable to it (see Jenkins 2011; Schaffer forthcoming). I discuss some issues in the pure logic of grounding in chapter 7.

Turning to the impure logic of grounding, it is popular to claim that true disjunctions are grounded by their true disjuncts and that true conjunctions are grounded by their true conjuncts (Correia 2010: sect. 6; Fine forthcoming b: sect. 7; Rosen 2010: 117):

(G-d) If p then: $[p \vee q]$ is grounded by $[p]$.

(G-c) If p and q then: $[p \wedge q]$ is grounded by $[p]$ and $[q]$.⁹

In addition, it is often claimed (Fine forthcoming b: sect 7; Rosen 2010: 117) that existential generalisations are grounded in their instances, in the sense that

(G-ex) If a is F then: $[\exists xFx]$ is grounded by $[Fa]$

Universal quantification is perhaps more difficult. It is metaphysically possible for all the actual instances of a universal generalization to obtain but not the generalization: there may be a counterexample. So – on the assumption that metaphysical entailment is a necessary condition of grounding – the instances are not going to serve as grounds, even taken collectively (Rosen 2010: 118–121 discusses various responses).

The pure logic of grounding is clearly a central component of any properly developed theory of grounding. It is far from clear that the impure logic of grounding has the same status. This is because it is controversial whether there are *any* interesting interactions between grounding and the logical constants. Paul Audi seems committed to denying these claims, since his sparse ontology of facts does not include disjunctive or existentially general facts (Audi forthcoming a: sect. 2). In chapter 2 sect. 2.4.1 I will suggest (G-d), (G-c) and (G-ex) should be rejected and that these principles are only plausible if we confuse explanatory and epistemic senses of ‘grounds’.

⁹Closely related principles can be found in discussions of truthmaker theory: see, for instance, Rodriguez-Pereyra 2006.

1.6.4 Is there a relation of grounding?

I will treat relations as polyadic properties.¹⁰ I take the question of whether there is a grounding relation to be, to a large extent, independent of controversies in the metaphysics of properties. The claim that there is a grounding relation (i.e. polyadic property) is inconsistent with the claim that there are no properties but I take it to be non-committal with respect to whether properties are abstract or concrete and whether they are particular or universal.

In section 1.5 we canvassed some possible theoretical roles that grounding relations might be postulated to fill. If you do not believe that these roles need filling, or if you think that the grounding relation is not the best candidate for filling them, then it seems you should deny that there is a grounding relation – why should we believe in a grounding relation if it plays no explanatory role?

This point is strengthened by the fact that there are theories of grounding that are not ontologically committed to grounding relations. The theories developed by Fabrice Correia (2010) and Kit Fine (forthcoming a) seem not to imply the existence of grounding relations, because they are versions of the connective theory (see above: sect. 1.6.2). Given the availability of theories, like Correia’s and Fine’s, which do not imply the existence of a relation of grounding, philosophers who endorse enthusiasm_M need to establish that the grounding relation has a worthwhile theoretical role to play.

1.6.5 What are the relata of grounding?

If there is a relation of grounding, what kinds of entity stand in it? An important distinction is between what I will call ‘flat’ theories and ‘dimensioned’ theories. According to flat theories, grounding relates entities belonging to a single ontological kind. The leading version of the flat theory claims that grounding is a relation among facts. I will call this the ‘fact theory’ (I use ‘fact’ interchangeably with ‘state of affairs’ here). The fact theory is defended by Paul Audi (forthcoming a; forthcoming b) and Gideon Rosen (2010).

The flat theory contrasts with the dimensioned theory. The dimensioned theory claims that grounding relates entities of various different ontological kinds. The leading defender of the dimensioned theory is Jonathan Schaffer (2009).

This talk of ontological kinds needs to be handled with care. I do not mean to suggest a controversial Aristotelian thesis, according to which there are fundamental ontological categories and every entity falls into exactly one of them. I use the term ‘ontological kind’ in a fairly neutral manner. I assume that ontological theories use kind terms and that ontological kinds are denoted by them. Examples of ontological kinds include propositions, states of affairs, tropes, sets, types and universals. I have no objection to identifying entities from different categories, or reducing one category to another category, or to the claim that there are some entities that do not belong to any ontological category.

Dimensioned theories tend to be inhospitable to the idea that there is a simple, systematic correlation between grounding and explanation. To take an example, dimensioned theorists might well claim that Big Ben grounds Big Ben’s singleton set. What explanations are entailed by the claim that Big Ben grounds Big Ben’s singleton set? It does not seem right to say that Big Ben explains Big Ben’s singleton. When filling in the explanation ‘... because ...’, we need sentences, not names, to fill the blanks.

It is not easy to provide systematic rules for converting grounding claims to explanations, on the dimensioned theory (see Trogon forthcoming: sect. 3). To see this,

¹⁰Note that my usage of ‘property’ deviates, for instance, from that of Armstrong 1997: 85, who stipulates that properties are monadic.

consider the claim that Socrates is grounded by his constituent molecules. This claim seems to correspond with a host of explanations of Socrates' various properties in terms of those of his parts. But there is no way of reading these explanations off the grounding claim. The fact that the dimensioned theorist's notion of grounding floats freely from that of explanation might feed sceptical concerns about the intelligibility or utility of this concept of grounding (see chapter 5: sect. 5.5; in chapter 6 I defend the dimensioned theory by proposing a solution to this problem).

Flat theorists face questions too. It is controversial whether facts exist and any doubts about the existence of facts immediately passes over to grounding claims, if grounding is construed as a relation between facts. Furthermore, it is unlikely that defenders of this view about grounding can avoid the controversy about how facts are individuated. Audi (forthcoming a; forthcoming b) offers an account based on a sparse theory of facts whereas Rosen (2010) defends a more abundant theory of facts. More worryingly, however, it will emerge in chapter 5 that if the grounding relation only holds between facts, it is not fit to play some of the ontological roles we identified in sect. 1.5. The worry is that the fact theorist's grounding relation is a gratuitous ontological commitment, unfit to play the roles that motivate believing in the grounding relation in the first place.

1.6.6 Is grounding grounded?

Consider now the question: Is grounding fundamental or is it grounded? This question is not particularly clear. One natural way to understand it is as asking: Are facts about what grounds what themselves grounded? That is, can we metaphysically explain why instances of grounding obtain? Note that you do not need to believe in a relation of grounding to believe in facts about what grounds what. All enthusiasts face this question.

There are three possible answers: either facts about what grounds what are always grounded, or they never are, or they sometimes are and sometimes are not. Consider the first option (defended by Fine forthcoming b: sect. 11; Rosen 2010: sect. 13). A worry that some have had about the view that facts of grounding are always grounded is that it leads to an objectionable regress (Audi forthcoming b: sect. 3). Suppose that facts of grounding are always grounded – that is, any fact of grounding X is grounded by something else Y . Since facts of grounding are always grounded, the fact stating the grounding between X and Y – call it Z – is itself grounded. And the fact stating the grounding relation between Z and its grounds is also grounded. And so on.

Note that this regress does not imply that nothing is fundamental. Nor does it imply that there are infinite chains of grounding, of the form ' A is grounded by B , B is grounded by C ...'.¹¹ The regresses that are generated have the following dog-legged structure:

A is grounded by B ; [A is grounded by B] is grounded by C ; [[A is grounded by B] is grounded by C] is grounded by D ...¹²

Consider next the view that facts about what grounds what are not grounded by anything. This view faces the objection that if a fact about grounding – say, [[Diamond d 's atoms are arranged Z -wise] grounds [d is hard]] – is fundamental, this entails that some intuitively non-fundamental entities are constituents of some fundamental facts. In this case, d is intuitively non-fundamental and yet is a constituent of a fundamental fact.

This is a problem if any constituent of a fundamental fact is itself fundamental. If this principle is right then we will be committed to admitting that d is fundamental, contrary to appearances. Generalising, if facts about what grounds what are fundamental tout court, the distinction between fundamental and non-fundamental entities collapses –

¹¹I follow Rosen 2010: 116 in being agnostic about whether there are infinite grounding chains of this kind. Like Rosen, I take it to be, at least in part, an empirical question.

¹²See also chapter 5: sect. 5.4

everything is fundamental, because every constituent of any grounded fact is fundamental! (See deRosset 2010; Sider 2011: 106–111, 115–6; Trogdon forthcoming: sect. 7).

We might bite the bullet and deny that there is a distinction between fundamental and non-fundamental things; but there are at least two non-bullet biting responses. The first is to reject the claim that something is fundamental if it is a constituent of an ungrounded fact. There are natural competitors. We might say (with Schaffer 2009: 373) that something is fundamental if and only if it is ungrounded. Or we might say that x is fundamental if and only if the fact that x exists is ungrounded.

The second response is to deny that fundamentality should be cashed out in terms of grounding. The grounding theorist might borrow Sider’s idea that fundamentality should instead be cashed out in terms of a concept of metaphysical structure. This concept is invoked to cash out the intuition that some descriptions of reality ‘carve nature at the joints’ (see Sider 2011: ch. 1). The intuition is that some concepts – concepts like that of electron – mark objective joints in nature whereas others – like the concept of an electron or a cow – do not mark such joints. These joints in nature are reality’s metaphysical structure. By cashing out the concept of fundamentality in terms of this concept, we open up the possibility that there are ungrounded, but nonetheless non-fundamental, things.

Karen Bennett (2011b: 29) points out that there is different way of understanding the question, ‘Is grounding grounded?’. On this construal the question asks whether the grounding relation itself – or perhaps the fact that it exists – is grounded. Note that this question is only faced by defenders of enthusiasm_M. If there is no grounding relation then the question does not arise.

This question is sensitive to our general views about properties. Theories according to which properties are always non-fundamental (e.g. perhaps Lewis’s account which identifies properties with sets) imply that the grounding relation is non-fundamental.

Jonathan Schaffer raises the worry that the claim that the grounding relation is grounded by something else implies the dubious claim that the grounding relation grounding somehow bootstraps itself into being (this is his way of putting it: Schaffer manuscript: sect. 3.4). The worry is shared by Karen Bennett, who voices it as follows:

We are trying to tell a story about how the grounding relation comes to be, what brings it into the world, what makes it the case that it exists in the first place. That story cannot invoke grounding anywhere – neither in the ground itself, nor in the relation by means of which the ground counts as a ground (Bennett 2011b: 31).

It is not clear to me why we should believe the final sentence of this quotation. As Bennett notes (2011b: 31), there is no explanatory circularity involved, as long as the things that ground the grounding relation (or its existence) do not themselves include the grounding relation: in general, when X is grounded by Y , it does not follow that X is grounded by Y and the *grounding relation*. But if the problem is not explanatory circularity, I am not sure what it is.

1.6.7 One or many?

I framed enthusiasm_C and enthusiasm_M in such a way that enthusiasts seem to be committed to saying that there is just one primitive concept of grounding (in the case of enthusiasm_C) or just one sui generis relation of grounding (in the case of enthusiasm_M). But we should not build these claims into enthusiasm. The following questions warrant discussion: How many fundamental concepts of grounding should we recognise? How many sui generis relations of grounding should we recognise?

I said that it is plausible that there is just one concept of dependence at work in (1)-(5). But this claim concerns the pre-theoretic understanding of (1)-(5). Philosophers are free to introduce ambiguity into their language and draw fine-grained distinctions that ordinary usage does not mark. Perhaps there are important distinctions between these cases that our theory of grounding should draw.

In the closely related debate about ontological dependence, Kathrine Koslicki (forthcoming: sect. 7.5) argues that we should recognise two different concepts of ontological dependence (although she assumes a Finean framework according to which both notions can be analysed in terms of a concept of essence). Similarly, Kelly Trogdon (forthcoming: sect. 2) proposes to bifurcate the debate about grounding into a debate about grounding proper and a debate about ontological dependence. In this way, several apparent disputes can be resolved, by understanding the disputants as engaged in different debates.

By contrast, Paul Audi (forthcoming a), Gideon Rosen (2010) and Jonathan Schaffer (2009) take a single primitive concept of grounding to be at work in grounding claims. I will not discuss these questions at length in this dissertation, although I will return to them briefly in the concluding remarks at the very end. I adopt the working assumption that one concept of grounding is enough and – since I will go on to defend enthusiasm_M – I also assume that one relation of grounding is enough. It is good method to minimise our stock of primitive concepts and relations. If there is need to introduce more this will show up as an inability for a single fundamental concept or relation of grounding to play the theoretical roles we want grounding to play.

1.6.8 How does grounding stand to explanation?

All enthusiasts agree that grounding is somehow related to explanation. But what exactly is the relation between grounding and explanation? Kelly Trogdon (forthcoming: sect. 2) distinguishes between the identity theory and explanatory realism. According to the identity theory, grounding *just is* a special kind of explanation. Kit Fine seems to endorse this view:

[T]he relationship of ground *is a form of explanation*; in providing the ground for a given proposition, one is explaining, in the most metaphysically satisfying manner, what it is that makes it true (Fine 2001: 22, my emphasis).

This might be construed either as a property identification, in which case the identity theory claims that the grounding relation is identical with some explanation relation, or it might be construed as a conceptual identification or analysis – an identification of the concept of grounding with a concept of metaphysical explanation. Given that the identity theory has both a conceptual and a metaphysical variant, it is available even to those enthusiasts who endorse only enthusiasm_C and reject enthusiasm_M. Since Fine remains neutral on the existence of the grounding relation, I take it that he only endorses the conceptual variant of the identity theory.

In the context of explanatory realism (see above, sect. 1.5), grounding relations provide the metaphysical basis for a class of non-causal explanations. A question raised by explanatory realism is whether the relation between instances of the grounding relation and explanations is one-one or many-one or one-many or many-many. For instance, can a single instance of grounding underpin many explanations? Or is each explanation underpinned by its own unique grounding relation? Our answer to this is likely to depend on our account of the relata of grounding. An abundant fact theorist such as Rosen (2010) might say that the relation is one-one. A sparse fact theorist such as Audi (forthcoming a) might not have enough facts in his ontology to say this, and so is likely to claim that the explanations are more abundant than the instances of grounding. And dimensionalists

might only believe in a coarse-grained grounding structure over properties and particulars, in which case a very sparse metaphysical basis indeed has to account for a much more abundant domain of explanations.¹³

A third possible view is, in a sense, intermediate between explanatory realism and the identity theory. This is the view that it is false that the grounding relation underpins explanations (perhaps because there is no such thing as the grounding relation); but nonetheless grounding *claims* explain why explanations obtain. If connective theorists take this route they can, in principle, appeal to grounding to explain explanatory phenomena in a way that does not rely on postulating the grounding relation. I am not aware of anyone who endorses this view but seems to be a live option. Its availability shows that connective theorists are not obviously committed to the identity theory.

1.7 Summary and Prospectus

In this chapter, I have introduced the concept of grounding (sect. 1.2); distinguished it from concepts with which it might be confused (sect. 1.3); made some historical remarks about the contemporary debate (sect. 1.4); distinguished enthusiasm from scepticism (sect. 1.5) and outlined some central questions in the theory of grounding (1.6). We now move on to more substantive discussion of the topic and we begin, in chapter 2, by discussing various kinds of scepticism about grounding. Broadly speaking, my aims in chapter 2 are to clarify what is at stake in the dispute between sceptics and enthusiasts and to outline how I think enthusiasts should respond to sceptics. The anti-sceptical strategy I favour requires enthusiasm_M.

A sceptical challenge will emerge from chapter 2, to demonstrate the usefulness of grounding talk. In chapter 3 I discuss the ontological roles the grounding relation can play. In chapter 4 – which is something of an interlude in the overall dialectic – I discuss the role of grounding in metaontology. In particular, I discuss the thesis that grounded entities and facts are *ontological free lunches*. My aim in chapter 4 is to clarify this thesis and defend one version of it.

In chapter 5 I pick up the main argumentative thread again and argue that the fact theory should be rejected, because the relation of grounding that it describes is not fit to play some of the ontological roles discussed in chapter 3. I further argue that, if the grounding relation is to play these roles, we need to endorse the dimensioned theory.

Unfortunately, this theory is problematic. A major problem (mentioned above in section 1.6.5) is that, on the dimensioned theory, it is difficult to specify any systematic connections between grounding claims and explanations. We will see that this puts a large question mark over the dimensioned theory, for unless such connections can be specified, it is unclear whether grounding can play any role in the theory of explanation. In chapter 6 I propose style of regimentation for grounding that is designed to fix the problems with the dimensioned theory. This approach draws heavily on the account of truthmaking developed by Lewis (2003). Finally, in chapter 7, I discuss some issues in the logic of grounding. It will become clear that the style of regimentation proposed in chapter 6 bears heavily on our account of the logic of grounding. In particular, it requires us to sharply distinguish our account of the logic of grounding claims from our account of the logic of the grounding relation, for these do not coincide, on the view defended.

¹³Compare this issue to the issue of whether each truth or belief corresponds with a unique fact or whether a single fact can correspond with many truths. G. E. Moore claims that “every true belief has some peculiar relation [i.e. correspondence] to one fact, and one fact only” (Moore 1953: 256). By contrast, logical atomists claim that the facts are more sparse than the truths they correspond with: “Suppose it is a fact that Socrates is dead. You have two propositions: ‘Socrates is dead’ and ‘Socrates is not dead’... corresponding to the same fact” (Russell 1956: 187).

Chapter 2

Scepticism

2.1 Introduction

Recall our characterisation of enthusiasm in chapter 1 (sect. 1.5). Enthusiasm about grounding is the disjunction of the following claims:

Enthusiasm_C: The concept of grounding is irreducible to other concepts (like modal concepts or logical concepts); of great philosophical importance; so should be adopted as a conceptual primitive.

Enthusiasm_M: The relation of grounding is *sui generis* – i.e. not identical with relations we independently postulate, like supervenience relations; of great philosophical importance; so should be included in our ontology.

Enthusiasm_C and enthusiasm_M are different ways of ‘taking grounding seriously’, the first putting a conceptual spin on this and the second an ontological one. Enthusiasm is very popular among grounding theorists.

Scepticism about grounding, or ‘scepticism’ for short, is the view that neither enthusiasm_C nor enthusiasm_M is true:

Scepticism: Neither enthusiasm_C nor enthusiasm_M is true

Sceptics deny that there is an important and distinctive concept of grounding. As a result, sceptics think that the current interest in grounding is misguided.

There is a rapidly growing enthusiastic literature but there remains relatively little systematic discussion of scepticism (exceptions are Daly forthcoming; Hofweber 2009: sect. 2; Raven 2011). Nonetheless, my impression is that scepticism is popular among philosophers at large. It is quite common to encounter sceptical sentiments, cursorily expressed (see Bricker 2006: 271; Lewis 1983: 358; Thompson 1983: 211; Williamson 2007: 59). Speaking from my own experience, I have encountered sceptical views many times in conversations with philosophers.

We will see that there are several different sceptical theories. A taxonomy of sceptical theories is complicated if we take account of the fact that enthusiasts do not speak with one voice. Suppose we distinguish two sceptical theories S_1 and S_2 and suppose that there are two competing theories of grounding, T_1 and T_2 , both of which imply enthusiasm. It is open to sceptics to take different attitudes towards T_1 and T_2 . For instance, a sceptic might endorse S_1 with respect to T_1 but S_2 with respect to T_2 . Because our focus here is on scepticism rather than enthusiasm, it is much easier to conduct the discussion on the pretense that sceptics have as their target a single version of enthusiasm. No loss of generality is incurred by this simplifying assumption because we will not make any

controversial assumptions about the content of enthusiasm and so our discussion should generalise straightforwardly.

We proceed, in sect. 2.2, by outlining a sceptical analysis of grounding talk that I call ‘disjunctivism’. We will see that this analysis is reductive and that it does not suffer the problems that afflict modal analyses of grounding (see chapter 1: sect. 1.3.4). Disjunctivism serves as a sceptical foil – it shows that sceptics are not at a loss to understand grounding talk and so the burden is on enthusiasts to show that this account is impoverished in some way.

In section 2.3 I distinguish three kinds of scepticism. Then, in section 2.4 I consider how scepticism might be supported. In section 2.5 I sketch two new and hopefully promising strategies for replying to scepticism. These strategies are not for all enthusiasts because they require belief in the grounding relation – they turn on grounding’s ontological roles (as opposed to its conceptual roles). Ontological neutrality cannot be maintained if we adopt these strategies.

2.2 A sceptical analysis of ‘grounds’

Sceptics reject enthusiasm. But do they reject the language of grounding as well? They might but, as we will see in this section, they do not have to.

It is now widely accepted that grounding cannot be understood in terms of supervenience and, more generally, it is unlikely that an acceptable modal analysis of grounding is available (see above sect. 1.3.4 and the references provided there). Enthusiasts often conclude that the concept of grounding should be treated as primitive.

Modal analyses are not the only alternative to taking the concept of grounding as primitive. *Disjunctivism* is one alternative (not to be confused with a theory of perception that goes by this name). Disjunctivists do not reject grounding claims but they do deny that we should introduce a primitive concept of grounding to make sense of them.

Consider, for instance, the following plausible grounding claims:

1. Non-empty sets are grounded by their members
2. Composite objects are grounded by their parts
3. Mental states are grounded by brain states
4. Dispositional properties are grounded by non-dispositional properties.

The disjunctivist points out that we already have a range of philosophical concepts with which to frame claims like these, including the concepts of the part-whole relation, the membership relation and the realization relation. Talk of grounding is more general than talk of set membership or parthood, because all of (1)-(4) are instances of grounding, whereas only (1) is a case of set membership and only (2) is an instance of the part-whole relation. The disjunctivist defines the general concept of grounding disjunctively:

xx is grounded by yy iff xx bears R_1 to yy or ... xx bears R_n to yy

where $R_1 \dots R_n$ are the familiar relations that I have called ‘determination relations’ – we may assume the determination relations include the set membership relation, the part-whole relation and the realization relation – and ‘ xx ’ and ‘ yy ’ are plural variables. More carefully, I treat these variables as ranging over individuals and plurals. Or, to put

the point differently, I will treat an individual as the limit case of a plurality. I use these variables for generality, since I leave it open that the determination relations are plural.¹

Does the disjunctivist believe in a grounding relation? Perhaps so, if she believes in disjunctive properties. But disjunctive properties do not, in general, figure in good explanations. The disjunctivist thinks that our explanatory purposes are served by the determination relations. The disjunctivist seeks to establish that the explanatory roles that enthusiasts envisage for the grounding relation can be played adequately by the determination relations.

In sum, the disjunctivist recognizes a concept of grounding and may also recognise a relation of grounding. But she denies that either the concept or relation of grounding is philosophically important, because neither performs any explanatory work.

Disjunctivism has not been defended in the literature. But disjunctivists might take inspiration from the following comments by Daly:

[S]cepticism about talk of grounding need not carry over to scepticism about all forms of non-causal determination. Talk of the part-whole relation, supervenience, and counterfactual dependence, for example, is intelligible and useful. It is only the case of grounding that raises special problems. This point strengthens the sceptic's case because he can show that he already has an adequate tool kit for understanding talk of (say) metaphysical explanation or of physicalism, and so that such talk need not be understood in terms of talk of grounding (Daly forthcoming: sect. 2.4).

Similarly, Hofweber argues that alleged cases of grounding are really cases of something else:

There are many things that are prior or more fundamental than other ones, but they are so in many senses of these words. What is disputed and controversial is whether there is a special metaphysical sense of priority or fundamentality. This I deny (Hofweber 2009: 271).

Disjunctivism is one way of developing these comments.

Note that disjunctivism is less susceptible to counterexamples than the modal analyses that we considered in chapter 1 (sect. 1.3.4). This is because disjunctivism does not imply that grounding is an intensional relation – the individual determination relations are (in many cases) hyperintensional. For instance, there is no problem with the case of Socrates and his singleton set, as long as the set membership relation and not its converse counts as a determination relation. The set membership relation is as hyperintensional as grounding. Similarly, the problems about necessary facts are avoided. There is no reason to expect that, just because the necessary facts supervene on every other fact, the necessary facts bear some determination relation to everything (supervenience, I take it, should not be counted among the determination relations).

The availability of disjunctivism strengthens the sceptic's position because it shows that the sceptic is not at a loss to understand grounding talk; it shifts the burden of proof onto enthusiasts. Perhaps belief in some grounding claims is the default view. But enthusiasm goes beyond mere belief in grounding claims. Enthusiasts claim that grounding is *sui generis* (in either a conceptual or an ontological sense) and so endorsing enthusiasm involves some cost to theoretical economy. Disjunctivism allows the sceptic to give an account of grounding talk which is both deflationary and less susceptible to

¹This kind of variable seems needed, independently of the present discussion, to account for multigrade predicates – e.g. ‘cooked dinner’ – which can be satisfied by individuals and plurals. I take it that Boolos allows such variables by making “the customary logician’s assumption . . . that the use of plural forms does not commit one to the existence of two or more things of the kind in question” (Boolos 1984: 443).

counterexamples than competing modal analyses. So scepticism is surely the default view – the onus is on enthusiasts to show that belief in their view is warranted. Enthusiasts therefore face the following sceptical challenge:

Sceptical challenge: Show that the benefits of recognising a *sui generis* grounding relation or concept outweigh the theoretical costs incurred by doing so.

We will return to this challenge in section 2.6 of this chapter.

2.3 Varieties of scepticism

Sceptics reject enthusiasm but they do not speak with one voice. We can distinguish three versions of scepticism, corresponding with three different reasons that might be given for rejecting enthusiasm.

Meaning scepticism. Many sceptics object to the perceived obscurity or unintelligibility of the language of grounding, as that language is used by enthusiasts. Alex Oliver warns that “[w]e know we are in the realm of murky metaphysics by the presence of the weasel words ‘in virtue of’” (Oliver 1996: 48) and he even calls for the expression to be banned (1996: 69 fn. 56). Timothy Williamson claims that ‘in virtue of’ and ‘makes’ are obscure (Williamson 2007: 59). Judith Jarvis Thomson claims that talk of ontological priority is dark (Thomson 1983: 211). Similarly, Phillip Bricker claims that “[p]rimitive ontological determination is dark and mysterious” (Bricker 2006: 271).

Saying that a concept is obscure or unclear or dark can be heard as another way of saying that there is a lot we do not know about the concept – that there are lots of unsettled questions about the concept and that we lack a worked-out theory of it. But a concept can be obscure in this sense and still important and primitive. It is consistent with enthusiasm that there is a lot about grounding that we do not yet know.

I take these sceptical comments as gestures towards a stronger thesis, which I will call ‘meaning scepticism’:

Meaning scepticism: grounding claims, as interpreted by enthusiasts, are unintelligible.

It is obvious that meaning scepticism is inconsistent with enthusiasm – an unintelligible concept cannot be philosophically important. Meaning sceptics allege that, in enthusiasts’ mouths, grounding claims fail to express an intelligible concept and, *a fortiori*, fail to express a philosophically interesting concept. Chris Daly (forthcoming) and Thomas Hofweber (2009) provide the most thorough defences of meaning scepticism to date.

Error theory. I call the next version of scepticism the ‘error theory’. According to error theorists, grounding claims, as interpreted by enthusiasts, are intelligible but false. Error theorists take the same attitude to talk about grounding as they (presumably) take towards talk about phlogiston or unicorns. ‘Phlogiston’ is intelligible but the world does not contain any phlogiston and any claim that entails the existence of phlogiston is false. And claims that imply the existence of unicorns are intelligible but false, since the world does not contain any unicorns. Likewise, error theorists claim that there are no instances of grounding and so grounding claims, which imply the contrary, are systematically false.

Agnosticism. Like the error theory, ‘agnosticism’ grants that grounding claims, as enthusiasts interpret them, are intelligible. But agnostics argue that, so interpreted, we are in no position to assert or deny any grounding claims. Therefore we should remain agnostic about whether any such claims are true.

Agnosticism seems to be inconsistent with enthusiasm. If we are in no position to assert any grounding claims, it is unclear how they can play an important theoretical role. Conversely, assuming that we have reason to believe claims that are implied by good theories, denying that we are in a position to assert grounding claims is of a piece with denying that grounding claims are implied by good theories. And this, it seems, is inconsistent with enthusiasm's claim that grounding is philosophically important.

Neither error theory nor agnosticism has been discussed in the literature but these theories are not absurd. They present an important challenge to enthusiasts. A response to either agnosticism or the error theory will automatically work as a reply to the meaning sceptic, because we cannot have reason to believe grounding claims if they are unintelligible. But a response to meaning scepticism is not guaranteed to rebut either the error theory or agnosticism, because bad theories can be intelligible. So in order to establish enthusiasm, it does not suffice to show that the concept of grounding is intelligible. What is needed, in addition, is some reason to think that grounding plays an important explanatory role – that is, we need a response to the sceptical challenge.

2.4 Supporting scepticism

The moral of the previous section is that sceptics do not present a united front. In this section I consider how scepticism can be supported. It is likely that meaning scepticism, error theory and agnosticism need to be supported in different ways. One way to support error theory is to argue that grounding claims are committed to the existence of F 's and that F 's do not exist. Perhaps grounding claims are committed to the existence of facts, as some grounding theorists claim (Audi forthcoming a; Rosen 2010). Then any argument against the existence of facts would support the error theory.²

Another way of supporting the error theory is to argue that grounding claims should be rejected because they are theoretically redundant, in that they do not help to explain any phenomena and are not implied by any good explanations. It might be maintained, for instance, that the theoretical roles that grounding is supposed to play are better played by something else. Or perhaps the roles themselves are dubious and can remain unfilled without any loss to the overall explanatory power of our theory.

We could support agnosticism by arguing that grounding claims have epistemologically problematic ontological commitments. For instance, if grounding is a relation between abstract objects, then any epistemological doubts about abstract objects might pass over to grounding claims.³

2.4.1 Paradox

One strategy for supporting scepticism is to argue that the theories of grounding offered by enthusiasts threaten paradox and so should be rejected. Which forms of scepticism would this conclusion support? It depends on what you think paradoxical concepts are like. If such concepts are unintelligible then this strategy supports meaning scepticism. But it seems plausible that paradoxical concepts can be intelligible. For example, the concept of the Russell-paradoxical set – that is, the set of all non-self-membered sets – seems intelligible. And it seems unlikely that the claim that grounding is paradoxical would support agnosticism – surely, if a claim implies a paradox, this is reason to believe that the claim is false and not a reason to withhold judgement. Appeals to paradox are best taken to support the error theory.

²Although one man's modus ponens is another man's modus tollens – enthusiasts might reply that the plausibility of grounding claims provides an argument for believing in facts.

³Although enthusiasts might respond that the plausibility of grounding claims provides the required evidence that abstract objects exist.

Let us proceed by considering one possible paradox. Many enthusiasts think that grounding interacts with the logical constants in systematic ways. It is popular to claim that existential generalizations are grounded by their instances (see Fine forthcoming a: sect. 7; Rosen 2010: 117). Consider now the existentially general fact [Something exists]. It is natural to think that if existential generalizations are grounded by their instances then [Something exists] is grounded by every entity, since every entity is an instance of the generalization that something exists. Suppose then that [Something exists] is grounded by every entity. It follows that [Something exists] is grounded by itself. But this is absurd: [Something exists] is not grounded by itself because nothing is grounded by itself.⁴

This argument turns on the following claims:

(G-ex) $\forall x$ [Something exists] is grounded by x

(Irreflexivity): Nothing grounds itself

If enthusiasm were committed to (G-ex) and (Irreflexivity), then the fact that enthusiasm gives rise to paradox could be used as evidence that enthusiasm is false. (Irreflexivity) is accepted by many grounding theorists (see Audi forthcoming a: sect. 6; Rosen 2010: sect. 5; Schaffer 2009: 376). Note that enthusiasts do not automatically solve the problem by denying (Irreflexivity). Even if (Irreflexivity) is false, there is no denying that in many cases things do not ground themselves. The question is whether [Something exists] is among them and we do not have to appeal to (Irreflexivity) to judge that this fact does not ground itself. We might judge, for instance, that the corresponding explanation – i.e. ‘something exists because something exists’ – is false. So denying (Irreflexivity) does not immediately solve the problem.

A better strategy is to deny (G-ex). I suggest that it is not plausible to think that existential generalizations are always grounded by their instances. The connection between grounding and explanation supports this strategy. This is because it is not always plausible that existential generalizations are explained in terms of their instances. We can bring this out with an example. Suppose you want to know why there are any philosophers. There are, presumably, many legitimate ways to answer this question. We might give an evolutionary explanation, which appeals to purported evolutionary advantages of abstract thinking. Or we might try to construct a micro-physical or neurological explanation of why there are philosophers. But one strategy which is, I think, entirely fruitless is that of explaining this generalization in terms of its instances. We should, for instance, reject the claim there are some philosophers because Kripke is a philosopher. We wanted to know why there are any philosophers – how does pointing out that Kripke is among the philosophers provide us with any answer at all to this question? If we were puzzled about the existence of philosophers, would learning that Kripke is a philosopher remove the puzzlement? It seems to me that there is no explanation here at all. So I submit that existential generalizations are not always explained by their instances.

It might be suggested, in reply, that explaining why a philosopher exists by pointing out that Kripke exists is like explaining the broken fridge in terms of the Big Bang – i.e. it is a true objective explanation that has pragmatic defects, in ordinary contexts. But the Kripke case seems different to the Big Bang case. In the latter case, once we are familiar with the concept of objective explanation we can see immediately that the Big Bang does, in that sense, explain the broken fridge. But even if we are careful to think in terms of objective explanation, it is still implausible that existential generalizations are explained in terms of their instances.

⁴The claim that [Something exists] is grounded by every entity does not sit well with the fact theory, since according to that theory non-facts do not ground anything. Fine 2010 sect. 4 presents a version of the paradox that applies to the fact theory.

Many grounding theorists find (G-ex) plausible so if we are going to reject it we should aim either to accommodate or to explain away the intuitions that it is supposed to satisfy. One might try to accommodate the intuitions driving (G-ex) by claiming that existential generalizations bear some *grounding-like* relation to their instances, while maintaining that they are not grounded by their instances. Perhaps there is a special kind of conceptual explanation in which existential generalizations are explained in terms of their instances (see Künne 2003: 155; Schnieder 2006a: sect. 5). On this line, the intuitions that lie behind (G-ex) only motivate the superficially similar claim that existential generalizations are conceptually explained by their instances.

The topic of conceptual explanation is poorly understood at present so the strategy is difficult to assess (although Schnieder 2010 provides illuminating discussion). I take the Kripke example to suggest that existential generalizations are not explained *in any sense* – conceptual or otherwise – in terms of their instances. In any case, it is likely that appealing to conceptual explanation will only move the problem, since it is at least *prima facie* plausible that conceptual explanation is irreflexive (explanation in general seems irreflexive). So this strategy might be vulnerable to a revenge paradox. This is not directly relevant for scepticism about grounding (as opposed to scepticism about conceptual explanation) but it seems bad methodology for grounding theorists to relocate their problems to neighbouring debates.

A better approach is to explain the popularity of (G-ex) by appealing to the evidential/explanatory ambiguity that is pervasive in our explanatory idioms. We noted in chapter 1 that ‘grounds’, like ‘because’, has both an explanatory and an evidential usage (see chapter 1: sect. 1.3.1). On its evidential usage, to say that some fact grounds (or, perhaps more idiomatically, *provides* grounds) for another is to say that the former is evidence that the latter fact obtains.

Distinguish evidential and explanatory readings of the claim that existential generalizations are grounded by their instances:

(Ev) Existential generalizations are grounded (evidential) by their instances

(Ex) Existential generalizations are grounded (explanatory) by their instances

According to (Ev), the obtaining of a fact is good evidence that any existential generalization that the fact is an instance of obtains.

Consider again the Kripke example. It does seem that there are plausible readings of claims like ‘Some philosopher exists because Kripke exists’ and ‘That some philosopher exists is grounded by Kripke’s existence’. But it is important to keep in mind that these claims are ambiguous between evidential and explanatory readings. Since, as we have just seen, the explanatory readings are implausible, I suggest that the plausible readings are evidential readings. If you are challenged to provide evidence that there are philosophers, it would surely be admissible for you to point out that Kripke is a philosopher. So it seems that the fact that Kripke is a philosopher is good evidence that someone is a philosopher.

There is nothing special about the Kripke example. Generally speaking, I suggest that (Ev) is more plausible than (Ex). I grant that there is a plausible reading of ‘Existential generalizations are grounded by their instances’. But we must carefully distinguish the explanatory from the evidential reading of this claim. Since the explanatory reading has counterexamples, such as the example involving Kripke, I suggest that we should endorse (Ev) rather than (Ex). And this is enough to avoid the above paradox, since (Ev) lends no support to (G-ex), which employs the explanatory concept of grounding.⁵

⁵If ‘because’, understood evidentially, were irreflexive then there would be a threat of a revenge paradox. It is not obvious whether ‘because’, understood evidentially, is irreflexive. On the face of it, the claim that $[p]$ is evidence for $[p]$ may be treated as a trivial limit case. At least, claims of this form seem

Note that (Ev) is consistent with (Ex). In general, $[p]$'s explaining $[q]$ does not rule out that the obtaining of $[p]$ is good evidence that $[q]$ obtains. If the surface temperature of some planet is too high for the planet to sustain life, this fact might be good evidence that there is no life on that planet and also a good explanation of this fact. So I am not arguing that (Ex) should be rejected because (Ev) is plausible. My reason for rejecting (Ex) is that (Ex) implies that we can explain why some philosopher exists by pointing out that Kripke is a philosopher, and this is false.

We have discussed a paradox involving grounding's alleged interaction with existential generalization. Kit Fine has shown that similar paradoxes can also be generated by allegedly plausible claims about grounding's interaction with disjunction and universal generalization. I think the strategy just sketched extends to these paradoxes as well. That is, I take other alleged connections between grounding and the logical constants to rely on confusing explanatory and evidential considerations. To illustrate, some philosophers endorse the following claim:

(G-dis): If p then $[p \vee q]$ is grounded by $[p]$

Again, it is far from clear that we can explain why a disjunction is true in terms of its true disjuncts, although it is clear that the truth of a sentence is *good evidence* for the truth of disjunctions it figures in. And consider the following principle about conjunction, which has been defended by Kit Fine (forthcoming a: sect. 7) and Gideon Rosen (2010: 117):

(G-con): If p and q then $[p \wedge q]$ is grounded by $[p]$ and $[q]$

It is, I think, very implausible that we can explain why it is the case that p and q by pointing out that p and that q . If you were wondering why it is the case that p and q , how exactly is it illuminating to be told that p and that q ? There seems to be no explanation here at all.

The moral is this. (G-ex), (G-dis) and (G-con) are not compulsory and are far less plausible than they may at first appear (indeed, I find their popularity surprising). Appealing to paradoxes that rely on these principles cannot motivate scepticism, although it might motivate rejecting the theories that imply them.

2.4.2 Supporting meaning scepticism

Meaning sceptics might support their view by arguing that enthusiasts' talk of grounding fails to meet some general criteria that claims have to satisfy in order to be intelligible. The problem with this strategy is that it is unclear what criteria the sceptic could plausibly appeal to. Empiricist criteria for intelligibility have been proposed, according to which a (non-analytic) claim is only intelligible if it is related in some specified way to possible sensory evidence (see, e.g., Ayer 1936: 5-16; Carnap 1956). It is likely that grounding would not meet such criteria, since 'grounding' is not a term in an empirical theory. But empiricist criteria of intelligibility tend to be implausible and threaten to rule out much other metaphysical discourse, in addition to grounding talk. It is true that one might reject grounding because one rejects inflationary metaphysics tout court. But wider debates about the legitimacy of metaphysics need not detain us, for they are not to be settled in the theory of grounding. The question I want to focus on is whether there is special reason to reject grounding. It seems unlikely that there is a plausible general criterion for intelligibility that rules grounding talk out and that rules other metaphysical discourse in.

metaphysically innocent. That $[p]$ objectively explains why $[p]$ obtains is far less innocuous. According to this latter claim, $[p]$ bootstraps itself into existence, and this is very dubious.

Daly and Hofweber do not, in any case, appeal to general criteria for intelligibility in their arguments. Their scepticism is motivated by the reflective judgement that enthusiasts' talk of grounding does not make sense. And Daly, following Nelson Goodman (1954: Chapter 2, sect. 1), argues that judgements about intelligibility do not need to be supported with further arguments (Daly forthcoming: sect. 2.5).

Daly further supports meaning scepticism by arguing that the elucidations of grounding that enthusiasts provide do not succeed. Enthusiasts have tried to shed light on grounding in various ways. Daly focusses on three strategies. The first strategy is to elucidate the concept of grounding by specifying the logical properties of 'grounds'. For instance, enthusiasts often claim that 'grounds' is asymmetric, irreflexive, transitive, hyperintensional and non-monotonic (Rosen 2010: 115-7; Schaffer 2009: 376). But, as Daly claims, a specification of the logical properties of 'grounds' constrains, but does not fully determine, the content of that expression (Daly forthcoming: sect. 2.6).

We can illustrate Daly's point with an example. The predicates 'is more massive than' and 'is less massive than' express different concepts, because they have different extensions. Nonetheless, they share a range of logical properties. Both are asymmetric, irreflexive and transitive, for example; and it is difficult to see any logical property that they do not share. So differences in content between two expressions do not always show up as differences in their logical properties. So we should not expect, in general, that a specification of an expression's logical properties will uniquely determine the content of that expression. A specification of the logical properties of 'grounds' may shed light on the concept of grounding if we already grasp that concept but it seems unlikely to establish the intelligibility of the concept in the first place.⁶

The second strategy is to specify analytic connections between grounding and other concepts. Jonathan Schaffer (2009: 374) argues that 'grounds' can be used to define some useful metaphysical concepts. For instance:

x is fundamental \leftrightarrow_{def} there is no y such that y grounds x

x is a substance \leftrightarrow_{def} x is fundamental

x has a greater degree of reality than y \leftrightarrow_{def} x grounds y

x is a mere aggregate $x \leftrightarrow_{def}$ x has parts, all of which ground x

x is an integrated whole \leftrightarrow_{def} x has parts, all of which are grounded by x

He goes on to say that we can come to understand the concept of grounding via its role in these definitions: "To the extent these notions were antecedently comprehensible, the notion of grounding may be comprehended by its definitive role" (Schaffer 2009: 375). But this is dubious. As Daly points out (forthcoming: 2.6), these definitions tell us how to understand the concepts appearing on the left given a prior understanding of grounding. But it is unclear how they are supposed to help introduce grounding (see also Clark and Liggins forthcoming: sect. 2). Furthermore, we seem to lack an independent grip on the concepts being defined in the above definitions – the concepts of fundamentality, substance, degrees of reality, etc. These concepts seem closely related to that of grounding. Therefore specifying relations between these concepts and the concept of grounding is bound to be unhelpful for elucidating the latter concept (Daly forthcoming: sect. 2.6).

Furthermore, grounding does not seem to be analytically connected to any other concepts that we do antecedently understand. For instance, while supervenience is inde-

⁶Jonathan Schaffer, for one, is not deceived about this. He admits that "[formal] constraints will not uniquely characterize the [grounding] relation on their own. But in combination with the illustrative cases, they may shed further light" (Schaffer manuscript: sect. 1.2).

pendently intelligible, it does not seem that there are plausible biconditionals connecting the two concepts (see chapter 1: sect. 1.3.4). Grounding theorists themselves argue for this conclusion (e.g. Schaffer 2009: 364). The result is a dilemma for proponents of this strategy:

[E]ither the terms appealed to are such close cognates to ‘grounding’ that they are as obscure as it is, or the terms appealed to are sufficiently and independently clear but their connection to ‘grounding’ is questionable (Daly forthcoming: sect. 2.6).

The third strategy Daly considers is to explain grounding by presenting plausible examples of it. I relied on examples in chapter 1 (sect. 1.2). My goal there was to isolate a concept that competent speakers already have, viz. the intuitive concept of grounding that the debate starts with. But Daly (forthcoming: sect. 2.7) denies that the concept of grounding at work in enthusiasm can be assimilated to the intuitive concept expressed by ordinary use of ‘in virtue of’ (see this chapter, sect. 2.5, for further discussion of this issue). Can the philosophical concept of grounding be communicated by presenting examples of it?

In some contexts, citing examples is useful for communicating unfamiliar concepts. We can, it seems, ostensibly explain the offside rule by showing video footage of the rule being broken alongside comparable footage of the rule not being broken, as a foil. As long as our choice of examples make salient the patterns that we are trying highlight, it is reasonable to expect them to help communicate the target concept.

Daly doubts that enthusiasts are able to shed light on grounding like this. He does not deny that some concepts can be elucidated in this way but he denies that grounding can be. When a sceptic is presented with a list of putative cases of grounding,

[e]ither he finds that he does not understand the claims being made, and so the examples offered are as baffling as the general claim that some facts ground others. Or he finds that the examples are best construed as examples of relations of supervenience or identity, relations that are supposedly distinct from the relation of grounding (Daly forthcoming: sect. 2.6).

This view fits naturally with a disjunctivist account of grounding: the idea here is that grounding talk is intelligible only insofar as it is understood in terms of quotidian relations like supervenience and identity.

2.5 Replying to scepticism

One reply to the meaning sceptic begins by pointing out how familiar the language of grounding is (Witmer et. al. 2005: sect. 3.2). We saw in chapter 1 (sect. 1.2) that ‘in virtue of’ is used intelligibly in everyday discourse, by ordinary standards of intelligibility. But this observation is consistent with all but the most implausible versions of meaning scepticism. Sceptics and enthusiasts should agree that ‘in virtue of’ is used intelligibly in ordinary discourse – only extreme and implausible versions of scepticism would deny this.

To bring the reply to bear on more plausible versions of meaning scepticism, we need to ask: When enthusiasts use ‘in virtue of’ and ‘grounds’ in their theories, are they using these expressions in the ordinary way? If they are then there is little doubt that their use of these expressions is intelligible, by ordinary standards.

It is controversial whether enthusiasts use these expressions in the ordinary way. Chris Daly claims that “talk of grounding seems to be entirely a philosopher’s invention” (Daly forthcoming: sect. 2.7). Daly does not deny that the language of grounding is intelligibly

used outside of philosophical discourse (Daly forthcoming: sect. 2.7). He makes two claims that are significant for us: he claims (A) that enthusiasts do not use the language of grounding in the same way as ordinary speakers. And he claims (B) that enthusiasts' use of this language is unintelligible.

Thomas Hofweber (2009) also endorses this pair of claims. On (A), Hofweber makes the following observations:

The most common way to be an esoteric metaphysician in practice is ... [to] rely on a notion of metaphysical priority: some notion that claims that certain facts or things are metaphysically more basic than other facts or things. These notions of metaphysical priority usually get terms that are very familiar from ordinary discourse, but are supposed to have a *distinctly metaphysical meaning*. Examples of such notions are: more fundamental, prior, ultimate, the ground of, etc. (Hofweber 2009: 268, my emphasis).

On (B) Hofweber asserts that “[w]hat is disputed and controversial is whether there is a special metaphysical sense of priority or fundamentality. This I deny” (Hofweber 2009: 271).

By contrast, some enthusiasts reject (A). These enthusiasts claim to be using the language of grounding in the ordinary way, to express a familiar concept.⁷ This view seems to be taken by Jonathan Schaffer, who remarks “how natural and intuitive the notion of grounding is” (Schaffer 2009: 375) as well as Gideon Rosen (2010: 134) and Witmer et. al. (2005: sect. 3.2). The strategy of replying to meaning scepticism by rejecting (A) is tempting. But I think this temptation should be resisted.

It seems to me that enthusiasts should endorse (A) – enthusiasts should concede to Daly and Hofweber that the concept of grounding is a technical concept of philosophical theories and not a concept that is used in ordinary discourse. The first thing to note is that this concession is consistent with enthusiasm. The sceptical component of Hofweber and Daly’s view is (B). The claim that enthusiasts use the language of grounding in an unfamiliar manner does not undermine the intelligibility or usefulness of the concept that enthusiasts express with these expressions.

I endorse (A) because many competent users of the language of grounding, Daly and Hofweber among them, are baffled by the same language as it figures in enthusiasts’ theories. The best explanation of this fact is that enthusiasts use the language of grounding in an unfamiliar way. Furthermore, it is doubtful that the concept expressed by ‘in virtue of’ in ordinary discourse will vindicate enthusiasm. By construing grounding as a technical concept, enthusiasts dodge worries to the effect that the concept expressed by ‘in virtue of’ in ordinary discourse is too ‘thin’ for serious philosophical work and that it is ‘merely a placeholder’ for more substantive concepts (I have encountered both views in conversations with philosophers). It is not particularly obvious what these worries amount to or whether they are justified. But by construing the concept of grounding as a technical one we sidestep these worries.

If we concede (A) to Daly and Hofweber then we abandon the strategy of assimilating the concept of grounding to quotidian concepts. We need to find a different strategy for replying to meaning sceptics.

2.5.1 Analogy

In my view, Daly is right that the strategies he discusses (see sect. 2.4.2) are unlikely to provide us with an independent grip on the concept of grounding. But if we broaden

⁷A weaker view along the same line is that grounding is similar enough to a familiar concept that the intelligibility of the latter ensures the intelligibility of the former. I will not discuss this weaker view separately, although it is perhaps all that the philosophers discussed would endorse.

our inquiry and consider grounding's ontological roles, a satisfactory response to meaning scepticism is more likely. This is because appealing to grounding's ontological roles opens up at least two further strategies that enthusiasts can pursue to elucidate the concept of grounding. These strategies are familiar from other discussions but they have not been applied to the case of grounding.

The ontological roles of grounding will be our focus in the next chapter. For now some provisional remarks about one of them should suffice to illustrate the anti-sceptical strategies I want to discuss. I take the view that the grounding relation plays a similar role to the causal relation in the theory of explanation (chapter 3: sect. 3.2). As Schaffer puts it, “[g]rounding is something like metaphysical causation” (Schaffer forthcoming). If the grounding relation has this role then we can appeal to the analogy between grounding and causation to help introduce the concept of grounding. In the present context we can safely assume that the concept of causation is intelligible independently of the concept of grounding.

Analogies can be useful for communicating concepts (Quine 1960: 14-15). Consider, for example, the concept of luminiferous ether from (now obsolete) wave theories of light. Luminiferous ether was postulated as a medium through which light waves are conducted. We can communicate this concept to someone not yet familiar with it by drawing an analogy between light waves and water waves. We might say something like this: “Consider the relation between a body of water and the waves that pass through it. The luminiferous ether is what stands in that relation to light waves”. As another example, we might introduce someone to the idea of subatomic forces by drawing an analogy between an atom and the solar system: “subatomic forces between the nucleus of an atom and the orbiting electrons are analogous to the forces of attraction between the sun and its orbiting planets”.

In the case of grounding, the analogy I have in mind can be put schematically as follows: causation stands to causal explanation as grounding stands to non-causal explanation. It is controversial how causation stands to causal explanation, but one very natural claim is that the causal relation *underpins* causal explanation or, alternatively, that the causal relation is the *ontological correlate* of causal explanation (for defence of this view, see Kim 1994; Salmon 1984: 13). Pursuing the analogy, we say that just as causal relations are the ontological correlates of causal explanations, grounding relations are the ontological correlates of non-causal explanations. It seems to me that this analogy can provide a grip on the concept of grounding in the way that the water analogy gives us a grip on the concept of luminiferous ether.

In explaining the analogy I said that causation underpins explanations. But ‘underpins’ seems, in this context, to mean something like ‘grounds’. So we might worry that we need to grasp the concept of grounding in order to understand the analogy, in which case the analogy is useless for explaining grounding to someone not yet familiar with the concept. This worry can be easily sidestepped. Eschewing talk of underpinning, we could characterise the analogy just as effectively using the ordinary concept of explanation – we say that just as causal relations explain (in the ordinary sense) the truth of causal explanations, so grounding relations explain the truth of non-causal explanations.

Note that it might be difficult to specify the class of explanations that are underpinned by grounding relations without invoking some grounding-like concept, like that of metaphysical explanation. As Daly (forthcoming: sect. 2.6) observes, the concept of metaphysical explanation seems closely related to that of grounding and it is doubtful that we understand the concept of metaphysical explanation independently of the concept of grounding.

Suppose we express the analogy between grounding and causation as follows: “Grounding is the relation that underpins metaphysical explanations, just as causation underpins causal relations”. Expressed like this, the analogy will not be dialectically effective, be-

cause we do not have an independent grip on the concept of metaphysical explanation – our interlocutor is likely to ask the follow-up question: “Which explanations are the metaphysical ones?”. To avoid this worry we should construct analogies case by case, ignoring wider questions about delineation. We can say, for any causal explanation ‘ p because q ’ and any metaphysical explanation ‘ r because s ’, that a certain instance (or several instances taken together) of the causal relation explains the truth of ‘ p because q ’ and, analogously, an instance of the grounding relation (or several taken together) explains the truth of ‘ r because s ’. This relies on *our* being able to identify cases of metaphysical explanation, but it does not require our interlocutor to have this ability.

2.5.2 Functional definition

The analogy with causation gives enthusiasts some traction in the debate against meaning sceptics but, in general, one might worry that analogies are of limited value for explaining the meaning of theoretical terms. As Quine says with respect to the theoretical term ‘molecule’:

[T]he fact is that what one learns of molecules by analogy at all is meagre. One must see the molecular doctrine at work in physical theory to get a proper notion of molecules, and this is not a matter of analogy (Quine 1960: 15)

The idea that theoretical terms get their meaning from the theories in which they are embedded is familiar and plausible. One way of putting it is that the content of a theoretical term t in theory T is determined by the role that t plays in sentences of T . With this idea in hand, enthusiasts might reply to the meaning sceptic by specifying the role that ‘in virtue of’ or ‘grounds’ plays in sentences of the theory of grounding. This is probably the strongest card that the enthusiast can play in replying to meaning sceptics.

Perhaps the most influential approach along these lines is that defended by David Lewis (1970). Lewis outlines a strategy, drawing on work by Carnap and Ramsey, for defining a theory’s theoretical terms – that is, terms that are not intelligible independently of the theory – in terms of terms that are antecedently understood. Lewis summarises his approach succinctly in the following passage:

A theory implicitly defines its theoretical terms. If, without benefit of any prior definition of ‘entropy’, thermodynamics says that entropy does this, that, and the other, we may factor that into two parts. There is an existential claim – a ‘Ramsey sentence’ – to the effect that there exists some quantity which does this, that, and the other (or near enough). And there is a semantic stipulation: let that which does this, that, and the other (or near enough), if such there be, bear the name ‘entropy’. Here is another way to say it: the theory associates with the term ‘entropy’ a certain theoretical role. It claims that this role is occupied. And it implicitly defines ‘entropy’ as a name for the occupant of the role (Lewis 1997: 326).

In a little more detail, Lewis’s strategy for defining theoretical terms is as follows (for further details, see Lewis 1970). Suppose we have a theory, T . Let ‘ t_1 ’...‘ t_n ’ be T ’s theoretical terms and assume that all other terms in T are meaningful. Prepare T by formulating it as a single conjunctive sentence and by construing ‘ t_1 ’...‘ t_n ’ as names. (This is a simplifying move and, Lewis claims, no loss of generality is suffered as long as our ontology includes such entities as properties and functions and our language contains a rich enough stock of copulas like ‘instantiates’).

Formulate T as a sentence of the form:

(T*): $\Phi(t_1 \dots t_n)$

The predicate ‘ Φ ’ contains only antecedently understood terms: all the theoretical terms of T occur within the brackets.

By replacing each token of the name type ‘ t_1 ’ with a token of the variable type ‘ x_1 ’, and likewise for the other theoretical terms, we obtain an open sentence called the *realization sentence* of T :

$$(T\text{-real}): \Phi(x_1 \dots x_n)$$

Any set of entities that satisfy (T-real), or nearly satisfy it, are said to *realize* T .

By existential generalization from (T*) we obtain its *Ramsey sentence*:

$$(T\text{-Ram}): \exists x_1 \dots x_n \Phi(x_1 \dots x_n)$$

T ’s Ramsey sentence says that there is some realization of T . Note (T-Ram) contains none of T ’s theoretical terms, so by itself does not provide an interpretation of the theoretical terms.

The interpretation of the ‘ $t_1 \dots t_n$ ’ is given by T ’s *Carnap sentence*, which is the following conditional (interpret ‘ \rightarrow ’ as the material conditional):

$$(T\text{-Car}): \exists x_1 \dots x_n \Phi(x_1 \dots x_n) \rightarrow \Phi(t_1 \dots t_n)$$

(T-Car) provides an interpretation of ‘ $t_1 \dots t_n$ ’ only given further claims about interpreting T . Lewis proposes that we are to understand each theoretical term as denoting at most one entity – so if T is multiply realized, its theoretical terms denote nothing and the theory is false. It then follows from (T-Car) that if T has exactly one realization then it is realized by $t_1 \dots t_n$. If T is not realized at all then ‘ $t_1 \dots t_n$ ’ denote nothing. If it is realized by more than one set of entities then ‘ $t_1 \dots t_n$ ’ denote nothing.

Lewis then proposes to define the theoretical term ‘ t_1 ’ as follows:

$$t_1 = \text{the unique entity such that it, together with some } n-1 \text{ entities, comprises} \\ \text{the unique } n\text{-tuple of entities that satisfies (T*)}$$

Similar definitions are given for other terms too. They enable us to specify, using vocabulary that is non-theoretical relative to T , what entity is denoted by any given theoretical term, in any possible world. In this way they fix the meaning of T ’s theoretical terms (assuming that a specification of a term’s intension suffices for fixing its content).

Definitions like this are sometimes called ‘functional definitions’. How might a functional definition of ‘grounds’ proceed? Functional definitions are most familiar in the context of functionalist theories of mind (see Levin 2010 for an overview). Functionalists about mind define mental states in terms of the causal roles that mental states play. Pain might be understood as the state that is caused by various stimuli (stabbing and singeing etc.) and tends to cause certain behavioural patterns (wincing and whingeing etc.).

It seems clear that grounding cannot be understood in terms of the causal roles occupied by grounding relations – grounding relations do not seem to have any causal roles. Grounding’s theoretical roles are non-causal (see chapter 3). We therefore rely on a broad construal of ‘functional role’, which allows that some theoretical roles are non-causal.

How do we give a functional definition of ‘grounds’? In order to be dialectically effective against the meaning sceptic, it is obviously crucial that we specify grounding’s theoretical role without using ‘grounds’ or similar terms. This means that the strategy of functionally defining ‘grounds’ requires us to reject enthusiasm_C. A functional definition of ‘grounds’ will be a *reductive* definition, if we succeed in specifying grounding’s role without appealing to the concept of grounding. But the strategy does not require us to reject enthusiasm_M. The strategy requires us to assert the existence of the grounding relation – reductively defining ‘grounds’ in the proposed way does not eliminate the

grounding relation from our ontology (Hempel 1965b: 216; Lewis 1970: 428). This is why I am tempted to endorse enthusiasm_M while rejecting enthusiasm_C.

We will discuss grounding's ontological roles in chapter 3. It is worth giving a schematic description of how I anticipate the dialectic will proceed. First we identify the phenomena that we postulate the grounding relation to explain. Then we give a theory of grounding based on these roles. The grounding relation is then understood to be whatever (if anything) best satisfies the theory we develop.

Note that the strategy of functionally defining 'grounds' is not available to connective theorists because it requires us to postulate a relation of grounding. And if we pursue the strategy of functional definition, we must renounce the idea that ontological neutrality is desirable in the theory of grounding. Connective theorists who want to remain ontologically neutral must develop different replies to meaning scepticism.

2.6 Summary and conclusion

In this chapter we have distinguished three varieties of scepticism (sect. 2.3), considered how these theories might be supported (sect. 2.4) and we outlined (sect. 2.5) two new strategies that enthusiasts might pursue to defend their theory against meaning scepticism.

Establishing the intelligibility of grounding is just the start: the sceptical challenge posed by agnostics and error theorists remains. Notice the anti-sceptical mileage that we will have made if we can successfully give a functional definition of 'grounds'. This strategy requires us to think hard about the ontological roles that grounding plays. To implement the strategy we need to come up with an account of what grounding must be like in order to satisfy the roles. We then we can understand 'the grounding relation' as picking out (if it picks out anything) the relation that best satisfies the theory.

If we can implement this strategy it will provide a reply to the meaning sceptic. But we will also have half of a reply to the error theorist and the agnostic. One way – perhaps the only way – to reply to these forms of scepticism is to establish, firstly, that there is an important explanatory role for grounding to play and, secondly, that grounding is a good candidate for playing this role. A clear statement of grounding's ontological roles, and a clear account of how grounding is supposed to play these roles, would be an important part of such a reply. And this is precisely what the strategy of functional definition requires.

It remains to be shown that grounding's theoretical importance offsets the cost to theoretical economy that is incurred by introducing it into our theories. Answering this part of the sceptical challenge means establishing that the explanatory roles we identify are worth playing and are such that we should postulate a single relation of grounding to play them all (rather than splitting the work among other relations). Establishing this is sufficient for answering all three forms of scepticism and it is perhaps necessary as well.

Chapter 3

Roles

3.1 Introduction

This chapter discusses three central explanatory roles that grounding claims might play. The aim is to show that grounding is not theoretically fruitless: that there is an explanatory payoff associated with enthusiasm, which helps to offset the cost to theoretical economy associated with the view.

It is controversial, among enthusiasts, whether grounding has the roles I discuss. One way in which our account of grounding's roles is controversial is that the roles to be discussed are all *ontological* roles (see chapter 1: sect. 1.5) – that is, they are explanatory roles played by the grounding *relation*. Our account of grounding's roles is only available to those who endorse enthusiasm_M. Enthusiasts who deny that there is a grounding relation cannot appeal to these roles to motivate their view.

The first role to be discussed is in the theory of explanation, in the context of explanatory realism. In this capacity, the grounding relation is postulated as the ontological correlate of a class of non-causal explanations. Grounding's role in the theory of explanation is discussed in section 3.2.

Grounding also has a role to play in explaining features of the determination relations – that is, familiar relations such as mereological summation, set membership and realization. This role is discussed in section 3.3. Lastly, grounding relations provide candidate explanations of supervenience relations. This role is discussed in section 3.4.

3.2 Explanatory realism

Grounding relations arguably have a role to play in the metaphysics of explanation. Recall (chapter 1: sect. 1.5) that *explanatory realism* is the thesis that explanations are underpinned by dependence relations. In this section I discuss grounding's role in explanatory realism.

3.2.1 Underpinning explanations

In the context of explanatory realism, instances of the grounding relation are the ontological correlates of a class of non-causal explanations (Audi forthcoming a: sect. 3; Kim 1994: sect. 5; Ruben 1990: ch. 7).

Note that explanatory realism does not itself commit you to positing grounding relations. David Lewis (1986b), for example, seems to endorse explanatory realism but only with respect to causal explanations. Since non-causal explanations fall outside the scope of Lewis's theory, he is not committed to positing any relations to underpin these non-causal explanations.

I think that it is odd to restrict explanatory realism to causal explanations. The intuition driving explanatory realism is that explanations require a metaphysical basis. The intuition concerns explanation generally, not just causal explanations. Ross Cameron takes a similar line in defence of truthmaker maximalism:

Truthmaker theory is a theory about what it is for a proposition to be true; it's just not the kind of theory that can apply only in a restricted domain. What possible reason could one have for thinking of some propositions that they need to be grounded in what there is that doesn't apply to all propositions? (Cameron 2008: 412)

Mimicking Cameron's rhetorical question, I ask: What reason is there to think that some objective explanations need an ontological basis, but not all? Given the apparent oddness of restricting explanatory realism to causal explanations, I will mean by 'explanatory realism' a thesis that is not restricted to causal explanations.

Paul Audi (forthcoming) and Gonzalo Rodriguez-Pereyra (2005) argue from explanatory realism to the existence of grounding relations:

[W]hat makes explanation possible is the presence of certain determinative relations between entities . . . So invoking explanation of the truth of the proposition that the rose is red will not save us from postulating a relation (namely grounding) between some entity and the proposition (Rodriguez-Pereyra 2005: 28).

An explanation whose correctness is underwritten by a determination relation, then, is an explanation that tells us something about the nature of our world. The interesting point, for our purposes, is that not all such explanations can be causal (Audi forthcoming a: sect. 3).

The following argument is implicit in Rodriguez-Pereyra's and Audi's comments. (1) Some version of explanatory realism is true; (2) some true explanations within the scope of the realist thesis are non-causal; (3) so there are non-causal determination relations; (4) so there is a relation of grounding.

We will see, in section 3.2.2, some considerations that may help to support (1) and (2) of this argument. For now, focus on the move from (3) to (4). This move requires substantive additional premises. We can bring this out by considering disjunctivism (see chapter 2: sect. 2.2). Disjunctivists aim to secure the explanatory payoffs offered by enthusiasm without postulating the grounding relation or introducing a primitive concept of grounding. The disjunctivist need not reject explanatory realism. Suppose she does endorse explanatory realism. She will deny that the grounding relation has a role to play in explanatory realism. Instead, she seeks to show that non-causal explanations are underpinned by instances of the determination relations – instances of the constitution relation, the set membership relation, the realization relation, and the rest. To support the move from (3) to (4) in the above argument, we need to show that the disjunctivist cannot develop an adequate version of explanatory realism without postulating the grounding relation.

Audi (forthcoming a: sect. 3) argues that the stock of determination relations is not extensive enough to implement this sceptical strategy: there are some metaphysical explanations that are underpinned by a relation but are not underpinned by any of the determination relations, and grounding must be introduced to accommodate these cases:

One who agrees that identity cannot serve to make explanations correct might still think some other, appropriately asymmetric, non-causal relation is available. One might appeal here to the relation of constitution . . . it is clear

that not every putative case of non-causal explanation can be supported by the constitution relation . . . So even if we allow some explanations to be underwritten by the constitution relation, we still need a non-causal relation of determination [i.e. grounding] to account for the correctness of certain other explanations (Audi forthcoming a: sect. 3)

Audi rightly points out that explanatory realists have to invoke relations other than identity and constitution to underpin some explanations. Consider, for example, the explanation: ‘The ball is red because it is maroon’. Redness seems to be neither constituted by nor identical to maroon-ness. His conclusion, that grounding is needed to underpin some explanations, does not follow from this. There are relations beside identity and constitution that disjunctivists can appeal to. In the maroon-ness case he, the most natural candidate is determinate-determinable relation. Other candidate determination relations include the mereological summation relation, the set membership relation, and the realization relation. What is needed is an example of a non-causal explanation which cannot be explained by the presence of any determination relation and Karen Bennett (2011a) has shown that there is a rich stock of potential determination relations for the disjunctivist to appeal to. So it is moot that the disjunctivist suffers a deficit of this kind.

Perhaps there are plausible explanations that cannot be accounted for in terms of the determination relations. Michael Raven (forthcoming: sect. 3.2.2) argues that explanations of the following form resist assimilation to quotidian relations: x is holy because x is loved by the gods. This may be right, but it is unclear that endorsing such explanations at a cost of introducing grounding is better than rejecting them to avoid that cost. The disjunctivist may be prepared to bite the bullet in particular cases by denying the truth of the problematic explanations. So even if we succeed in isolating some explanations that the disjunctivist cannot account for in terms of the determination relations, it is unclear whether this fact suffices to motivate postulating the grounding relation. The route from explanatory realism to realism about grounding relations is not straightforward.

I suggest that the move from (3)-(4) should be supported by arguing that grounding relations are needed even if every non-causal explanation has a corresponding determination relation. We do this by showing that the work done by grounding cannot be done by the determination relations on their own, however abundant these are. I will try to support this view in section 3.2.2 and section 3.3 of this chapter. In a nutshell, the idea is that without a unifying grounding relation, it is mysterious what the determination relations have got to do with explanation and so it is mysterious how they play the role in explanatory realism that, we are supposing, disjunctivists give them. If this is correct then a direct route from explanatory realism to realism about grounding relations is established.

3.2.2 Explaining explanatory asymmetries

There are arguments for enthusiasm_M that do not presuppose explanatory realism. Consider Jonathan Schaffer’s claim that “[g]rounding is something like metaphysical causation” (Schaffer forthcoming). One idea this claim suggests is that grounding and causation play analogous roles in the theory of explanation.

Causation is sometimes invoked to explain explanatory asymmetries. A classic example involves a flagpole and its shadow (this example derives from Bromberger 1966: sect. 5). Consider the following explanations:

- (a) The shadow cast by a flagpole is 10 meters because the flagpole is 10 meters and the sun’s elevation is 45 degrees

- (b) The flagpole is 10 meters and the sun's elevation is 45 degrees because the shadow cast by the flagpole is 10 meters

(a) is very plausible while (b) is very implausible. The challenge is either to explain why explanatory asymmetries like this obtain or to explain away the intuition that they do. Several responses to this problem have been discussed (see Hempel 1965 352-4; Hausman 1998: 157; Kitcher 1989: 484-7). One very natural proposal invokes causation. The idea is that the asymmetry of explanation is explained in terms of the asymmetry of causation. On this line (a) is successful because the explanandum sentence describes a fact or events that is causally subsequent to the event or fact described by the explanans. But (b) fails, because its explanandum describes facts that are causally antecedent to those described by its explanans.

This is a plausible explanation of the asymmetry between (a) and (b). But it does not provide a general solution to the problem of explaining explanatory asymmetries because this challenge also arises with non-causal explanations (Wieland and Weber 2010: 359). Witness,

- (c) Diamond *d* is hard because *d*'s constituent carbon atoms are arranged *Z*-wise

- (d) Diamond *d*'s constituent carbon atoms are arranged *Z*-wise because *d* is hard

Note that we do not need to endorse the general thesis that metaphysical explanations are always asymmetrical. Wieland and Weber (2010: 363) claim that this needs motivation and is unobvious. The falsity of this general thesis would not undermine the claim that there is an asymmetry between (c) and (d) to be explained.

There is no prospect of explaining this asymmetry in terms of causation because (c) and (d) are not causal explanations. But we can develop a similar strategy by invoking grounding relations. The idea is that (c) is true because its explanans describes facts which ground its explanandum; whereas (d) is false because its explanans describes facts which are grounded by those described in its explanandum.

Can the determination relations be invoked instead of grounding to explain non-causal explanatory asymmetries? Mirroring the grounding theorist's strategy, the disjunctivist will presumably claim that a given non-causal explanation '*p* because *q*' is asymmetrical because there is some asymmetrical determination relation that underpins it. For instance, the asymmetry between (c) and (d) might be explained in terms of the asymmetry of the constitution relation or perhaps the multiple realization relation between hardness and a *Z*-wise arrangement of atoms.

The problem with this is that it is unclear what the determination relations have got to do with explanation. Consider, for instance, the set membership relation. Why is it the case that the existence of sets can be explained in terms of their members, but not vice versa? Calling the membership relation a 'determination relation' does not answer this question. The question is why the relation of set membership deserves to be called a 'determination relation'. There is a gap to be bridged between the determination relations and explanations.

The strategy outlined in chapter 2 (sect. 2.5.2) is to introduce 'grounds' in terms of its theoretical roles. If we postulate the grounding relation specifically in order to explain explanatory asymmetries then there is no explanatory gap to be bridged: if there is such a thing as grounding, it underpins explanations. This is not an optional claim about grounding which we might make, in addition to saying that grounding relations exist. It is analytic, given that we introduce 'grounds' partly in terms of its role in explanatory

realism. To paraphrase Lewis (1970: 427), sometimes explanations are not only possible but unavoidable.

So while there is a gap to be bridged between the determination relations and explanations (unless these are understood in terms of grounding – see the next section), no such gap separates grounding from explanation, given that grounding is introduced partly in terms of its role in the theory of explanation. Needless to say, I do not deny that the determination relations are connected to explanation. I just think that some explanation of this fact is needed. This brings us to the next explanatory role for grounding, in the theory of the determination relations.

3.3 The determination relations

It may be that the best way to understand some determination relations is in terms of grounding. A good case study is the theory of realization proposed by Ernest lePore and Barry Loewer (1989): “Exactly what is it for one of an event’s properties to realize another? . . . We propose to understand this connection as a necessary connection which is explanatory” (LePore and Loewer 1989: 179). It is very natural to understand LePore and Loewer as proposing a grounding-based analysis of realization here.

The idea that realization should be understood in terms of grounding is controversial (see Morris 2010: sect. 1 for an overview of the options). But if we already believe in grounding then it is quite natural to endorse this idea. Kevin Morris (2010: 396) points out that it is common to claim that if some non-physical properties are physically realized, then the former properties (despite being non-physical) are physicalistically acceptable. In addition, he notes that “it has become increasingly common for philosophers to advance definitions of physicalism and related doctrines in terms of realization” (Morris 2010: 396).

These theoretical roles – of conferring physicalistic respectability and characterising physicalism – have also been envisioned for grounding. On the first of these, consider the following remarks by Jonathan Schaffer:

“Empiricist scruples and nominalistic demands may be met if the entities in question are grounded. For instance, if numbers are indeed grounded in the concrete realm, then (i) they may be known via their concrete grounds, and (ii) they would be brought down to earth” (Schaffer 2010: 361).

And on the second, Barry Loewer characterises physicalism as the view that “the fundamental properties and facts are physical and everything else obtains in virtue of them” (Loewer 2001: 39). The theoretical roles of grounding and realization seem very close. Realization starts to look, in this light, like a special case of grounding.

Obviously, disjunctivists cannot say this because disjunctivists understand grounding in terms of the determination relations – grounding cannot, therefore illuminate any of the determination relations. Theories according to which some determination relations should be understood in terms of grounding are not absurd and yet are not compatible with disjunctivism. Enthusiasts can appeal to whatever arguments are provided in favour of these theories to motivate their position: this is explanatory work that the disjunctivist cannot replicate.

So far we have considered the option of appealing to the concept of grounding to shed light on the determination relations. This is a conceptual role for grounding. More importantly, for our purposes, is the following ontological role. Karen Bennett points out that the determination relations have some interesting features in common (Bennett 2011a).¹

¹Bennett uses the term ‘building relation’. Her use of this term is very similar to my use of ‘determination relation’. The difference is that she allows that grounding itself might be a building relation, whereas

According to Bennett these relations form something like a natural kind. She does not deny that there are differences between determination relations. Different determination relations take different relata, according to standard views at least. Her point is that there is a core of shared features. Firstly, they are asymmetric and irreflexive. Secondly, they are connected to notions of explanation and dependence:

[B]uilding relations license ‘in virtue of’ locutions – a composed object exists in virtue of its parts, a realized property is instantiated in virtue of the instantiation of its realizer, a microbased property is instantiated in virtue of the instantiation of its plural base, and so forth (Bennett 2011a: 89-90)

Intuitively, the determination relations are *dependence* relations. It is reasonable to seek some explanation of these pervasive similarities. Audi puts the point as follows:

It may be formally open ... that the similarities among the cases [i.e. the metaphysical relations cited] are pure coincidence, that they are not species of a genus at all. But I think this view is much less plausible than it at first appears. Consider: each case involves non-causal explanation; each appears metaphysically necessary; each involves the instantiation of one property making another property to be instantiated; the relevant properties in each case seem to be essentially connected with one another. Such pervasive similarity among such diverse subject matters cries out for explanation. I propose that what accounts for the similarity is simply that there is a single relation at work in each case (Audi forthcoming b: sect. 1).

Postulating the grounding relation provides us with candidate explanatory proposals. The idea is that the grounding relation is related to the particular determination relations $R_1 \dots R_n$ in such a way that these relations inherit the relevant features from the grounding relation. We can illuminate the strategy by considering two ways in which it might be developed. I stress that disjunctivism does not provide materials for a rival explanation along these lines. We clearly do not explain similarities in a series of things by pointing out that there is some disjunction whose disjuncts refer to those things.

Call the first proposal the ‘determinable thesis’. According to this, the grounding relation is a determinable relation (like the relations of being taller than and being the same colour as) that has all and only the determination relations $R_1 \dots R_n$ as determinates. On this proposal facts about grounding – its formal properties and its being explanatory – combine with facts about the determinate-determinable relation – roughly, that determinable properties tend to share properties with their determinates – to explain why the particular determination relations have the common features that Bennett identifies. Why are they all explanatory? Because they are all determinates of grounding, and grounding is explanatory. Why are they all asymmetric? Because they are determinates of grounding, and grounding is asymmetric.

The second proposal is the ‘identity thesis’. This is the thesis that names for determinations relations (‘constitution’, ‘set-formation’, ‘realization’ etc.) are different names for the grounding relation. Kelly Trogdon, in a forthcoming survey article, characterises the view as follows:

According to this view there is but a single distinctive dependence relation/operator answering to our grounding talk. The advocate of the univocality view claims that ‘realization’, ‘constitution’ and the like just are other

I understand the determination relations as those appealed to in a disjunctivist analysis of grounding. Since grounding cannot be appealed to by the disjunctivist, it is not a determination relation on my usage

names for this relation/operator, and we use these terms to indicate specific features of the arguments in question (Trogon forthcoming: sect. 1).

We can also present the identity thesis as a property identification: the realization (constitution etc.) relation *just is* the grounding relation. Or better: the determination relations are *special cases* of grounding. For example, we might suggest that constitution is grounding where the relata are concrete, and set membership might be grounding where the grounded entity is a set (it is important to note that the identity thesis should be distinguished from the implausible claim that the words ‘constitution’, ‘realization’ etc. are synonymous with ‘grounding’).

According to the identity thesis, facts about the grounding relation combine with a fact about the identity relation – namely, Leibniz’s law – to explain why the determination relations have the properties they do. They are all asymmetric because they are identical with (or special cases of) grounding, and grounding is asymmetric; they are all explanatory because they are all identical with grounding, and grounding is explanatory.

These proposals illustrate possible roles for grounding in the theory of the determination relations. But, as we will see in a moment, both proposals face problems. If these problems were insurmountable, this fact would threaten grounding’s ability to play the proposed role in the theory of the determination relations. We therefore need to argue that these problems are not insurmountable.

Let us begin with the identity thesis. We characterized the identity thesis by saying that each determination relation is identical with grounding. That is, for any determination relation R , $R =$ The grounding relation. Given that the identity relation is symmetric and transitive, it follows that, for any pair of determination relations R_1 and R_2 , $R_1 = R_2$. We also characterized the identity thesis by saying that the determination relations are ‘special cases’ of grounding. But this was a fudge. If a determination relation is a special case of grounding, how can it be identical with grounding? If determination relations R_1 and R_2 are different special cases of grounding, how can $R_1 = R_2$?

I used the phrase ‘special cases’ to give the appearance of consistency between the claim that each determination relation is identical with the grounding relation and the apparent fact that the determination relations differ in certain respects. For example, it seems that the set membership relation always takes a set as a relatum, whereas the part-whole relation is not restricted in this way. And the set membership relation is generally taken to be non-transitive whereas the part-whole relation is generally taken to be transitive. If these relations differ in these ways then, by Leibniz’s law, they are not identical – and calling them ‘special cases’ of grounding will not solve the problem.

Before outlining a response to this problem, I should make a couple of assumptions explicit. To focus our discussion, I will ignore possible controversies in set theory and mereology that might bear on it. In particular, I will assume that set theorists at least *appear* to agree that the set membership relation is non-transitive and that mereologists likewise *appear* to agree that the part-whole relation is transitive (the need for the cautious reference to appearances will become apparent shortly). I will also assume that we should not rewrite set theory or mereology to suit the identity thesis. I have no objection to the idea that developments in the theory of grounding might lead to revisions in set theory or mereology. But I will assume that if the identity thesis is inconsistent with accepted views in set theory or mereology then it is the identity thesis that should be rejected. This assumption favours the opponent of the identity thesis, so I beg no questions by making it.

If we endorse the identity thesis then we have to deny that the determination relations differ in any of their properties. The challenge is to show that this view is consistent with (what I assume are) received opinions in set theory and mereology. In order to meet this challenge, we first need to argue that there are some predicates whose properties

are not mirrored by those of the property that the predicate denotes.² Let us say that a predicate with this feature is *refractive* (since such predicates ‘distort’ the nature of the property). There is reason, independent of the present debate, to believe that some predicates are refractive. For example, the predicate ‘is heavy’ is monadic but the property it picks out is polyadic: weight properties are relational and an object is heavy only if it stands in a gravitational relation to some distinct object. This is a particularly good example of refractiveness in the present context, because the fact that this predicate is refractive is surprising and unobvious. That weight properties are relational was an empirical discovery; we could, by ordinary standards, be a competent user of ‘is heavy’ without knowing that weight properties are relational. In this way ‘is heavy’ contrasts with ‘is married’.

The key claim that the defender of the identity thesis should make is that the predicates ‘is part of’ and ‘is a member of’ are refractive – although, like ‘is heavy’, they are not obviously so. She can then maintain that the differences that apparently obtain between the part-whole relation and the set membership relation are in fact only differences between the predicates ‘is part of’ and ‘is a member of’. Since she claims that these predicates are refractive, she can deny that differences between them reflect differences in the relations they denote.

To illustrate, the defender of the identity thesis grants that all instances of the following schema are true:

If x is part of y and y is part of z then x is part of z

And she grants that not all instances of the following schema are true:

If x is a member of y and y is a member of z then x is a member of z

So she grants that a certain pattern of inference is valid for claims of parthood which is not valid for claims of set membership. She grants that ‘is part of’ is transitive while ‘is a member of’ is not. But this is consistent with the identity thesis, since the identity thesis does not entail that these *predicates* are identical. And if ‘is a part of’ and ‘is a member of’ are refractive, we cannot conclude that the underlying relations denoted by these predicates have different properties.

How do we account for the differences between ‘is a part of’ and ‘is a member of’, if not by appeal to differences in the relations that they denote? One option is to argue that transitivity is built into the syntax of ‘is part of’. Similarly, we might claim that there is a syntactical restriction on ‘is a member of’, such that the right argument place of this predicate is never satisfied by a non-set. On this line, the differences between the predicates ‘is part of’ and ‘is a member of’ are syntactical rather than semantical and do not indicate that these predicates denote different relations.

We might wonder whether this view is really consistent with what set theorists and mereologists say. It is doubtless true that set theorists sometimes say that the set membership *relation* is non-transitive. Similarly, mereologists might say that the part-whole *relation* is transitive. But can we be sure that they are carefully distinguishing between talk of predicates from talk of relations? It is far from obvious that they are. After all, they have no reason to carefully observe this distinction. The distinction perhaps only becomes significant in high-level theorizing about the determination relations. If they are not carefully observing this distinction, we should take their talk as non-committal on the issue at hand.

²I will not discuss, in this context, the view that there are some meaningful predicates which do not denote any property at all. It is not obvious how this view bears on the view under discussion. We are considering cases in which a predicate does denote a property, but where there is a mismatch between the predicate and the property denoted.

The challenge we faced was to argue that the identity thesis is consistent with received views in set theory and mereology. It is one thing to make a proposal consistent and another to make it plausible. It is tempting to complain that the view just sketched is objectionably ad hoc. The only reason I have given for believing that ‘is a member of’ and ‘is a part of’ are refractive is that, unless they are refractive, the identity thesis fails; and we might find it objectionable that the view lacks independent motivation.

Ultimately, the plausibility of the identity thesis will be determined by the importance of explaining the similarities that obtain between the determination relations and by how the identity thesis compares to rival explanations. If the identity thesis is the best candidate explanation for a phenomenon which genuinely needs explaining then there is no worry of ad hoc-ness. If the claim that ‘is part of’ and ‘is a member of’ are refractive is part of the best explanation of a phenomenon that stands in need of explanation, then that is all the motivation it needs – demands for *independent* plausibility are misplaced. To see this, consider what are called, in the philosophy of science, *self-evidencing* explanations (see Hempel 1965: 370-4). In self-evidencing explanations, an essential part of our reason for believing an explanatory hypothesis H is that H would, if true, explain some phenomenon that we antecedently believe obtains. For example, we might believe that there was a prowler just on the basis of the fact that this hypothesis best explains the footprints in the snow. That there is no *independent* reason to believe in the prowler seems not to matter.

Let us now consider the determinable thesis. An initial worry is that if the determinable thesis is inconsistent with the plausible claim that determinates under a given determinable (more carefully, those at the same level of determinacy) are ordered. In paradigm cases, this applies: colour shades are ordered by similarity relations (scarlet is more similar to fire-engine red than to burgundy); length properties are ordered along a length metric. But there is apparently no metric along which the determination relations are ordered. The claim that set-membership is more similar to multiple realization than constitution is strange and hard to assess.

Eric Funkhouser (2006: 549) says that it is a *truism* about the determinate-determinable relation that same-level determinates under a given determinable are ordered by similarity relations. But this is an overstatement. As Jessica Wilson (2009: 151) notes, Funkhouser provides no reason to prefer this strong claim to the weaker claim that ordering is a feature of *central* instances of the determinate-determinable relation, not a feature of *all* instances of it. And even if we grant that all same-level determinates of a determinable are ordered, we can introduce a new notion – the determinate-determinable* relation – which has all the features of the determinate-determinable relation, except that it lacks the ordering requirement, and frame the determinable thesis in terms of this notion.

For the record, I find the identity thesis more attractive than the determinable thesis. The identity thesis embodies an attractive metaphysical economy – it turns out that a single relation is referred to in a number of different theories (set theory, mereology, philosophy of mind etc.). Furthermore, the determinable thesis prevents grounding from featuring in reductive analyses of the (predicates denoting) determination relations. As we noted above, it is not absurd to think that some determination relations can be understood in terms of grounding. But the determinable thesis seems to be inconsistent with this. It does not seem that we can analyse determinate properties in terms of the determinables they fall under. For example, there is apparently no way to complete the following definition: For all x , x is scarlet $=_{\text{def}}$ x is red & ... (this is one way in which the determinate-determinable relation differs from the species-genus relation; see Rosen 2010: 127). Any arguments that can be given in favour of understanding the determination relations in terms of grounding will work, it seems, against the determinable thesis. And even lacking such arguments, I would prefer to leave this kind of analysis open. So I incline to favour the identity thesis over the determinable thesis.

It is important to note that both the identity and determinable theses are inconsistent with the claim that grounding only relates facts (a claim defended by Audi forthcoming a; forthcoming b; Rosen 2010). The following claim about determinates and determinables is highly plausible and widely accepted in the literature – indeed, it is another of Funkhouser’s truisms (Funkhouser 2006: 549):

An object instantiating a determinate also instantiates every determinable that determinate falls under.

To see the plausibility of this, just consider some examples: every scarlet thing is also red and coloured, everything that is 7 cm long has some length, and every circular thing is shaped.

The following instance of Leibniz’ law is also highly plausible, where ‘ R ’ and ‘ R^* ’ stand for relations:

If $R = R^*$ then any n -tuples of entities which instantiate R also instantiate R^*

The upshot of both the identity thesis and the determinable thesis is that anything that instantiates a determination relation also instantiates grounding. But here is the rub: the determination relations do not just relate facts. At least, some serious rewriting of set theory and mereology is needed if the fact theorist is to defend either the identity thesis or the determinable thesis. We have here the makings of an argument against the fact theory – and we will pick up the thread again in chapter 5 (sect. 5.3).

3.4 Explaining supervenience

Grounding has a role in explaining supervenience relations (Schaffer 2009: 364). The supervenience relations comprise a family of modal relations. They are all variations on a common theme. For an overview of the variety of supervenience relations, see McLaughlin and Bennett 2005: sect. 4. Loosely speaking, if something supervenes on something else then the former thing could not have been different without some corresponding difference in the latter.

Many philosophers are, rightly I think, suspicious of ‘brute supervenience’ – that is, supervenience relations that are unexplained (see Horgan 1993). Stephen Schiffer puts the complaint against brute supervenience forcefully (in this passage Schiffer specifically targets brute supervenience):

How could being told that non-natural moral properties stood in the supervenience relation to physical properties make them any more palatable? On the contrary, invoking a special primitive metaphysical relation of supervenience to explain how non-natural moral properties were related to physical properties was just to add mystery to mystery, to cover one obscurantist move with another. I therefore find it more than a little ironic, and puzzling, that supervenience is nowadays being heralded as a way of making non-pleonastic, irreducibly non-natural properties cohere with an acceptable naturalistic solution to the mind-body problem . . . the appeal to a special primitive relation of ‘supervenience’, as defined above, is obscurantist in the extreme (Schiffer 1987: 153-4).

There is some temptation to think that what is necessary does not need explanation. Pace Schiffer, it might be denied that supervenience theses need explaining on the grounds facts about supervenience (like modal facts generally) are never contingent.

Although there is some plausibility to this suggestion, I think it should be rejected. Just consider the following examples. Scepticism about brute supervenience might be motivated by a general scepticism about brute necessities (for this general scepticism see, e.g., Armstrong 1997: 157). But we need not endorse this general view to be suspicious of brute supervenience claims. (i) A person's lifespan supervenes on the astrological facts; (ii) all properties supervene on themselves; and (iii) redness supervenes on (all of) the determinate shades of red $r_1 \dots r_n$. Claims (ii) and (iii) are very plausible but the astrological claim (i) is very implausible. What is the diagnosis of this? It is very natural to answer this by pointing out that thesis (ii) obtains because the supervenient and subvenient properties are identical and (iii) obtains because the subvenient and supervenient properties stand in the determinate-determinate relation. By contrast, the reason that the astrological case is implausible seems to be that it is unclear why any sort of modal connection would obtain between a person's lifespan and astrological facts – the two sets of facts just do not seem related in the right kind of way.

The following generalization suggests itself: The claim that A supervenes on B is only plausible if there is some suitable relation between A and B , which explains why the one modally covaries with the other.³ It is debatable what relations are suitable for explaining supervenience relations. The least controversial candidate, it seems to me, is the identity relation (see McLaughlin and Bennett 2005: sect. 3.7; Nolan 2008: 183). For instance, it is very plausible that being water supervenes on being H_2O , in the sense that necessarily, if something is H_2O then it is water. And surely a good explanation of this fact is that the property of being water is identical with that of being H_2O . As Daniel Nolan points out,

Identity is always a good internal relation to invoke to explain superveniences, where it is available: for a case where there can be no change in B s without a change in A s is not mysterious if each B is identical to an A , for there can be no change in something without a change in that thing (Nolan 2008: 183).

According to the grounding approach to explaining supervenience, grounding is another relation that explains supervenience relations. Just as the identity between A and B explains why the one supervenes on the other, the fact that B is grounded by A would do equally well.

Scepticism about brute supervenience relations need not manifest as the demand for non-modal explanations of supervenience. Theories that are (allegedly) thoroughly non-modal, in the sense that they provide reductive analyses of modal concepts – theories like Lewisian modal realism – might not provide resources for explaining supervenience relations. On Lewis's theory the modal fact that psychological facts globally supervene on non-psychological facts turn out to be the (allegedly) non-modal fact that any Lewisian cosmos that is a physical duplicate of the actual world is a psychological duplicate as well. But there is still something to be explained: why are the Lewisian cosmoi like this? Even if there is no fundamental modality in Lewis's theory – even if supervenience claims can be transformed into non-modal claims about Lewisian cosmoi and their constituents – this does not mean that they do not require explanation.

The question of whether modality is fundamental is orthogonal to the question of whether supervenience relations can be explained. Moreover, there is a sense in which a proposed explanation of an instance of supervenience had better be modal. The facts cited must be relevant for explaining supervenience and, given the modal character of

³This is a vaguely Humean thought but it is not based on a controversial first principle like Hume's dictum – the thesis that there are no necessary connections between distinct contingent existences. I am agnostic about Hume's dictum, which is why I prefer to argue by appeal to intuitive judgements about particular cases. Wilson 2010 provides critical discussion of Hume's dictum.

supervenience claims, this presumably means that the facts cited must have modal implications. It would be unclear why the fact that each of the B 's is identical with an A would be relevant for explaining why A supervenes on B , if identity were a contingent relation – if it were consistent with the fact that A is identical with B that A might not have been B .

Nick Zangwill (1997: 513) argues that this means that the kind of explanations we are considering are bound to be either trivial, because they involve modality, or false, because they do not meet the relevance constraint. Zangwill argues that psycho-physical supervenience cannot be explained by mereological relations, but his reasoning readily generalizes to other supervenience theses and purported explanations of them:

Either to say that a part-whole relation holds itself involves commitment to supervenience so cannot explain it, or else it falls short of supervenience and cannot explain it . . . Maybe the idea of a part-whole relation just *is* the idea that the properties of parts together determine the properties of the whole they compose. If so, mereological supervenience builds in a supervenience relation. On the other hand, the part-whole relation might be a contingent one . . . But then the mereological relation falls short of the supervenience relation (Zangwill 1997: 513).

This reasoning over-generalizes because similar reasoning threatens identity-based explanations of supervenience, which seem to be clearly acceptable. Following Zangwill, we might argue that we cannot explain why being water supervenes on being H_2O in terms of the fact that being water is identical with being H_2O , for the following reason: *either* the hypothesis that being water is identical with being H_2O involves commitment to supervenience, in which case the proposed explanation is implausible (because circular); *or* it describes a merely contingent identity, which is not suitable for explaining the supervenience relation. But clearly the identity between being H_2O and being water does explain the supervenience of the one on the other. So Zangwill's argument must go wrong somewhere.

Zangwill offers us a false dilemma (which is disguised by the vague phrase 'involves commitment'). We are offered the choice between trying to explain an instance of supervenience in terms of itself or in terms of a contingent relation. We can grant that neither approach will work but these are not the only options. In the identity case, the fact that being water is identical with being H_2O is not the same as the fact that water supervenes on being H_2O . Rather, the former claim implies and explains the latter (since identity is not a contingent relation).

It is natural to take a similar line with respect to mereological supervenience. The idea is that the part-whole relation is distinct from the supervenience relation while still being non-contingent, in such a way that the mereological claim implies the supervenience claim. On this line, the fact that some things compose another is not the same as the fact that the properties of the latter supervene on those of the former; but this does not put us on the second horn of the dilemma because we need not concede that the relation between parts and wholes is contingent. The mereological claim implies the supervenience claim, without being identical with it.

What role does grounding have in explaining supervenience? Consider the following comments of Kim's:

Supervenience itself is not an explanatory relation. It is not a "deep" metaphysical relation; rather, it is a "surface" relation that reports a pattern of property covariation, suggesting the presence of an interesting dependency relation that might explain it (Kim 1993: 167).

These comments suggest grounding-based explanations of supervenience. This is how they are interpreted by Schaffer (2009: 364). I am unsure that this was Kim's own intention. In particular, it is not clear to me that Kim is prepared to postulate a *sui generis* relation of grounding to explain supervenience. I interpret Kim as a pluralist about dependence, in that he thinks that 'dependence' picks out a family of more or less related relations (see Kim 1994: 67). Indeed, the passage just quoted seems to be consistent with disjunctivism about grounding. For the disjunctivist, supervenience indicates the presence of some determination relation and *not* a distinctive relation of grounding.

So we need to ask: is there any need to postulate a distinctive, *sui generis*, relation of grounding in order to explain supervenience relations? Is there any reason that the disjunctivist's metaphysical resources fall short? The case for postulating grounding in this context, it seems to me, rests on grounding's ability to reduce the unexplained necessitation claims in our theory. Since brute necessity is something to be reduced, this is a count in favour of introducing grounding.

Grounding has to be a non-contingent relation if it is to explain supervenience relations. The explanatory payoff that grounding brings – as opposed to the more specific determination relations – is that it reduces the number of brute necessities in our theory. The idea is that we can explain a whole range of supervenience claims in terms of grounding, and these explanations require only whatever brute modality is required to cash out grounding's non-contingency. We do not need to invoke separate necessitation principles about each of the determination relations – about set membership or mereological summation etc. We need only postulate a suitable relation between the determination relations and the grounding relation (identity or the determinate-determinable relation, perhaps; see this chapter sect. 3.3). We can then explain why all the determination relations support supervenience theses in terms of the non-contingency of grounding. A host of otherwise brute necessities are reduced to one. We can see that the role of grounding in supervenience overlaps with its role in explaining the common features of the determinations relations.

3.5 Summary and conclusion

We have considered some of the ontological roles that a *sui generis* relation of grounding can play. Enthusiasts can cite these roles to support their view, for they show that postulating the grounding relation has an explanatory payoff. We might still decide that the cost to theoretical economy is not worth the benefits. That requires delicate judgement but the systematizing effect that grounding has on our metaphysics is a genuine payoff. So grounding relation is not idle – is has seemingly worthwhile roles to play in our theory, which apparently cannot be played by any of the determination relations individually or by a disjunctive relation understood in terms of them.

Furthermore, we have a simple reply to the meaning sceptic. There can be no grounds for finding grounding talk unintelligible: 'grounding' refers to the relation, if there is one, that explains the supervenience relations in a relevant class and that the determination relations are all determinates of (or identical with) and that explains why the non-causal explanations in a specified class are true. There may be not such relation; but there is surely no problem understanding the claim that there is one.

Chapter 4

Ontological free lunch

4.1 Introduction

In this chapter we conclude our discussion of grounding's theoretical roles by considering an important role that grounding plays in the theory of ontology. In particular, we will consider a view that can be summarized by the slogan: non-fundamental entities, unlike fundamental ones, are *ontological free lunches*. Call this slogan the 'ontological free lunch doctrine'.

The ontological free lunch doctrine has been defended by many philosophers in recent years, not all of them working in the theory of grounding. These philosophers include Armstrong (1997: 12-13), Melia (2005: 75), Schaffer (2009: 361), Sider (2011: 169 fn. 10)

Defenders of the ontological free lunch doctrine face two urgent questions: How should we formulate the slogan more clearly? and What reasons are there (if there are any) to believe it? These are the questions to be discussed in this chapter.

Regarding the first question, there are two contentious concepts in the ontological free lunch doctrine. The first is the concept of fundamentality. My view is that this concept should be cashed out in terms of grounding. Not all philosophers agree. David Armstrong, for instance, claims that *supervenient* entities and facts are ontological free lunches (1997: 12-13). Joseph Melia understands it in terms of truthmaking (Melia 2005: 75). And Theodore Sider argues that talk of fundamentality should be understood in terms of a concept of metaphysical structure (for explanation of this notion see Sider 2011: ch. 1).

I will understand fundamentality as follows:

(Fundamentality): For any x , x is fundamental \leftrightarrow_{def} Nothing grounds x ¹

This is not the only way to understand fundamentality in terms of grounding but it is, in my view, the best.

If you think that grounding only relates facts then (Fundamentality) is problematic because it implies that all non-facts are fundamental (since non-facts are never grounded). Fact theorist therefore might suggest,

(Fundamentality*): For any x , x is fundamental \leftrightarrow_{def} x is a constituent of an ungrounded fact

Louis deRosset (2010: 75) understands fundamentality in this way (Sider 2011: 106 defends a similar claim).

This analysis of fundamentality puts a lot of pressure on us to claim that facts about what grounds what are grounded. For suppose these facts are not grounded. Then

¹This formulation is found in Bennett 2011b: 27 and Schaffer 2009: 373.

the fundamental/non-fundamental distinction is in danger of collapse, because any constituent of a grounded fact $[p]$ would also be a constituent of an ungrounded fact $[q]$, namely the ungrounded fact that reports the grounding relation between $[p]$ and its grounds. (Fundamentality*) implies that intuitively non-fundamental entities, like elephants and tectonic plates, would count as fundamental, if facts about what grounds what are ungrounded (see deRosset 2010; Sider 2011: 106–111, 115–6; Trogon forthcoming: sect. 7).

The claim that facts about what grounds what are grounded is not obviously false (for defence of this claim see Bennett 2011b: 33–5; Fine forthcoming a: sect. 11; Rosen 2010: sect. 13). But it is controversial and an analysis of fundamentality should not commit you to it. And the commitments of the proposal do not stop there. Defenders of (Fundamentality*) have to claim that facts about what grounds what are grounded by facts that contain only entities that are plausibly fundamental (note that Bennett’s proposal has this character; the proposals of Fine and Rosen seem not to). In addition, defenders of (Fundamentality*) have to find grounds for mereological facts (e.g. $[a$ is part of $b]$), set-theoretic facts (e.g. $[a$ is a member of $\{a\}]$), facts about determinates and determinables (e.g. $[\text{scarlet is a determinate of red}]$), given that they plausibly have non-fundamental particulars and properties as constituents.

It is difficult to understand the concept of fundamentality in terms of grounding, if grounding only relates facts (see also Schaffer manuscript: sect. 3.1). So much the worse for this account of the relata of grounding, I think. In any case, I will reject the claim that grounding only relates facts in chapter 5 (for independent reasons) and will assume (Fundamentality) in what follows.

My main focus in this chapter will be on the second contentious concept in the above slogan: that of an ontological free lunch. It is not immediately clear how to understand the phrase ‘ontological free lunch’. I will, following Jonathan Schaffer and Peter Schulte, defend the view that this phrase is best understood in terms of theoretical economy (sect. 4.3). But I disagree with these philosophers about how exactly we should develop this view and in section 4.4 I will argue against their view that the relevant kind of theoretical economy is ontological economy. I will argue that the ontological economy of a theory is affected by fundamentals and non-fundamental alike and in section 4.5 I will offer a more plausible account of the kind of theoretical economy is at issue in the ontological free lunch doctrine.

It is important to note that the ontological free lunch doctrine is controversial even among philosophers who believe in grounding. Paul Audi believes in grounding but denies that there is any sense in which non-fundamental entities are ontological free lunches:

On my view, grounded facts and ungrounded facts are equally real, and grounded facts are an additions of being over and above the facts in which they are grounded. The mere fact that some entity is grounded does not make it any more (or less) ontologically innocent. The grounded is every bit as real – and real in precisely the same sense – as that which grounds it (Audi forthcoming a: sect.1).

In fact, I am sympathetic to Audi’s concerns: I think that both grounded and ungrounded entities are real in the only relevant sense of the word, namely in the sense that both grounded and ungrounded entities *actually exist*. But this need not conflict with the ontological free lunch doctrine. I will show that we can understand the ontological free lunch doctrine without dubious distinctions between different senses of reality (sect. 4.5). By showing this, I hope to show that, properly understood, the ontological free lunch doctrine is very plausible.

The discussion is put forward in an ecumenical spirit, to provide a plausible and conservative version of the ontological free lunch doctrine that nonetheless shares the key

methodological import of more dubious versions. This should be of interest for philosophers, like Audi, who believe in grounding but are sceptical about some of the more esoteric claims that defenders of the ontological free lunch doctrine sometimes make. For it will turn out that the ontological free lunch doctrine can be construed in such a way that it itself comes for free – it is not, as I understand it, a substantive commitment over and above commitment to grounding.

4.2 The truthmaker approach

Defenders of the ontological free lunch doctrine disagree about whether we should understand the ontological free lunch doctrine in the material mode or the formal mode. Let me begin by explaining this contrast. Call the set of all ontological free lunches A and the set of all fundamental entities B . Those who frame the discussion in the material mode say that there is some relation between the members of A and those of B which makes the entities in A free lunches. Schaffer (2009: 353), for instance, thinks that if x is grounded by y then x is an ontological free lunch. And Armstrong (1997: 12) claims that if x supervenes on y , then x is an ontological free lunch.

By contrast, those who use the formal mode say that the relevant relation is the truthmaking relation. This relation holds between the members of B , or facts containing them, and *truths about* the members of A . This ‘truthmaker approach’ is favoured by Cameron (2008; 2010a; 2010b) and Melia (2005). Melia sums up the truthmaker approach:

[O]ur conception of this free lunch is quite different to Armstrong’s. It’s not that we have postulated a new kind of entity which, because this new entity is supervenient, somehow comes for free. Rather, we have found a way of accounting for certain sentences, certain quantificational and referential *talk* about properties, without having to postulate the entities that the statement seemed to refer to (Melia 2005: 75, original emphasis).

Proponents of the truthmaker approach claim that their approach – unlike the alternatives of Armstrong and Schaffer – enables us to avoid ontological commitment to non-fundamental entities, without denying or paraphrasing plausible claims about them. This is supposed to be a selling point of the approach. For instance, it enables us to claim that tables exist and that teacups are brittle, while remaining uncommitted to tables and teacups. Melia claims that the truthmaker approach provides

a way of accounting for sentences [that quantify over non-fundamental entities] without dismissing them as meaningless, without having to find a paraphrase, and *without having to accept the entities that the sentence apparently quantifies over and refers to into our ontology* (Melia 2005: 77, my emphasis).

And Ross Cameron argues that

we should view the (strict and literal) truth of such claims [as ‘this table exists’, ‘this chair exists’, etc.] as not bringing an ontological commitment to tables, chairs, etc. It is true to say that there are such things; but that it is true does not commit us to admitting such things into our ontology (Cameron 2010a: 249).

What are we to make of these claims? It seems to be standard to use ‘ontological commitment’ in such a way that we are ontologically committed to F ’s if we believe that F ’s exist (as long as the belief is literal and we cannot paraphrase reference to F ’s away). But it is clear that Cameron and Melia do not use the term ‘ontological commitment’ in

this way. Using terms of the form ‘ $\langle p \rangle$ ’ to denote propositions (read ‘ $\langle p \rangle$ ’ as abbreviating ‘the proposition that p ’), Cameron and Melia say that we can believe that $\langle F \rangle$ ’s exist \rangle is (literally and non-paraphrasably) true without being ontologically committed to F ’s. They are using ‘ontological commitment’ is a special way.² So what are theories ontologically committed to, according to Cameron and Melia? Theories are committed to truthmakers for the claims made in the theory.

There is no problem with interpreting ‘ontological commitment’ in the manner of Melia and Cameron, but we should not assume that attendant ideas typically associated with the concept of ontological commitment will pass over to the new interpretation. In particular, we should not assume that Occam’s razor does not apply to ordinary existence claims, just because these claims do not ontologically commit us – in the new sense of the phrase – to anything. We do not achieve gains in ontological economy by redefining ‘ontological commitment’, any more than we get five legged dogs by stipulating that tails are to count as legs. So I think the alleged selling point is spurious. The truthmaker approach seemingly provides no advantages over the alternative and it is unattractively indirect. Furthermore, the unusual understanding of ‘ontological commitment’ is likely to cause confusion. So I will follow Armstrong and Schaffer by framing the discussion in the material mode.

4.3 The concept of an ontological free lunch

The phrase ‘ontological free lunch’ comes from David Armstrong. He uses a variety of other expressions more or less equivalently with ‘ontological free lunch’:

[W]hatever supervenes or, as we can also say, is entailed or necessitated ... is *not something ontologically additional* to the subvenient, or necessitating, entity or entities. What supervenes is *no addition to being* (1997: 12, my italics)

These alternative expressions – ‘not ontologically additional to’ and ‘no addition of being’ – bring out the relational character of the concept of an ontological free lunch. By analogy, a comestible lunch might be free in a relational sense and a non-relational sense. In the non-relational sense, it is on the house: you pay nothing. In the relational sense it is free once you have purchased something else (your drink, say). Non-fundamental entities are free lunches, if at all, only in a relational sense. They come for free once we have already posited the fundamental entities that ground them. It would be legitimate to use the slogan: *buy fundamentals, get non-fundamentals free*. We should not use the slogan: *non-fundamentals are on the house*. As Daniel Nolan says, “the cardinal rule is that if you think you’re getting a free lunch, that means you’ve already paid for it somewhere else” (Nolan 2008: 183; see also Forrest 2009: 250).

Unfortunately, Armstrong says little to clarify what he means by the phrase ‘ontological free lunch’. One might claim, against Armstrong, that supervenient entities are an addition to being *in the only sense there is*: they are additions to the list of existents, extra items in our ontology. The ontological free lunch doctrine then becomes trivially false, on the assumption that fundamental and non-fundamental entities are distinct. Alex Oliver voices this sceptical view, saying that “[s]ince supervenient entities exist and are not identical to the entities upon which they supervene, they must be an ontological

²Cameron and Melia think that we can believe that $\langle \text{Tables exist} \rangle$ is true without ontological commitment to tables. This view could be reconciled with the standard usage of ‘ontological commitment’ by rejecting the equivalence: $\langle \text{Tables exist} \rangle$ is true if and only if tables exist. But this is not the way that Cameron and Melia seek to avoid ontological commitment to tables – they claim that truthmaking, not denying equivalences like this, is what gets them ontological free lunches.

addition” (Oliver 1996: 31, fn. 30; see also David 2005: 147-9). On Oliver’s view, Armstrong’s claim that supervenient entities are no addition to being is *obviously false*, unless the supervenient is identified with the subvenient.

We should not interpret Armstrong as asserting something obviously false unless there is no reasonable reading of his comments on which they are not obviously false. Armstrong exegesis aside, there are philosophically interesting theses in the vicinity that are not obviously false. One candidate interpretation involves a special concept of *real existence*, of the sort discussed by Ross Cameron (2010 a and 2010 b) and Kit Fine (2001). On this line, supervenient entities exist but they do not *really exist*; they are no addition of being in the sense that they are not *real existents*, in some technical sense. But I share the worries of Schulte (forthcoming: sect. 2) and Hofweber (2009: 266-75), who think that the proposed distinction between existence and real existence is obscure. So I doubt that this distinction can plausibly be appealed to, in order to cash out the ontological free lunch doctrine.

There is an alternative way to understand the ontological free lunch doctrine. On this line, we understand the phrase ‘ontological free lunch’ in terms of theoretical economy: fundamental entities count against the economy of a theory whereas non-fundamental entities do not. Non-fundamentals come for free in the sense that once we have borne the cost to theoretical economy of postulating fundamental entities $f_1 \dots f_n$ no additional cost to theoretical economy is incurred by positing further entities that are grounded by (or, for Armstrong, are supervenient upon) $f_1 \dots f_n$. This construal of the ontological free lunch doctrine is attractive because it does not require us to appeal to a dubious distinction between existence and real existence. There is no denying that much work needs to be done to clarify notions of theoretical economy and associated methodological principles. But this is everyone’s problem – we do not introduce unclarity or theoretical baggage by appealing to such notions.³

Talking in terms of theoretical economy is a simplification because it ignores the fact that there are several orthogonal dimensions of theoretical economy. For instance, a theory might be assessed for ontological economy, economy of primitive concepts, economy of brute unexplained facts or brute necessities or economy of fundamental laws. If we construe the ontological free lunch doctrine in terms of theoretical economy, we face the following question:

(Q) What kind of theoretical economy is relevant for the ontological free lunch doctrine?

We will discuss this question below but for now – for simplicity – I will stick with the placeholder notion of theoretical economy.

I think it is very natural to interpret the ontological free lunch doctrine in terms of theoretical economy. In doing so I am following several philosophers who have discussed the topic. Ross Cameron defends the view that,

when deciding which of two theories is more ontologically parsimonious, we ought to look at what’s needed to make each of them true, not at what each says exists. (Why should saying more things exist count against a theory if those things don’t have real being?) (Cameron 2010a: 250).

As a result, the claim that tables exist does not count against the ontological economy of a theory, according to Cameron, as long as it is made true by entities whose ontological costs have already been counted.

³Note that neither Marian David (2005: 147-9) nor Alex Oliver (1996: 31, fn. 30) consider this kind of explication of the concept of ontological free lunch in their sceptical discussions.

Sider endorses a similar principle (against the backdrop of his account of fundamentality in terms of ‘joint carving’):

[If] ontological language doesn’t carve at the joints, then why think that positing more entities would be worse? Occam’s (ontological) razor is based on the thought that “emptier” possibilities are *prima facie* more probable than “full” possibilities. But the measure of the fullness of a possibility should depend on its description in fundamental terms (Sider 2011: 169, fn. 10)

Louis deRosset characterises, without endorsing, the ontological free lunch doctrine as the view that “[t]he ontological sparsity of the world is determined by the number and variety of fundamental entities and kinds” (deRosset 2010: 75). It is clear that ontological sparsity is a measure of theoretical (specifically, ontological) economy. And Peter Schulte characterises the concept of an ontological free lunch as follows:

The term ‘ontological free lunch’, it seems to me, should best be understood along these lines: *a* is an ontological free lunch (relative to theory *T*) iff *a* belongs to the things that must exist if *T* is true, but does not count against *T* when we judge *T* for ontological parsimony (Schulte forthcoming: sect. 2)

Finally, Jonathan Schaffer claims that

Occam’s Razor should only be understood to concern substances: do not multiply basic entities without necessity. There is no problem with the multiplication of derivative entities – they are an “ontological free lunch” (Schaffer 2009: 361)

Most defenders of the ontological free lunch doctrine understand it in terms of theoretical economy. And these quotations also show that they usually take the relevant kind of theoretical economy to be ontological economy and the associated principle of theoretical economy to be Occam’s razor.

4.4 Against restricting Occam’s razor

We saw in section 4.3 that Cameron, deRosset, Schaffer, Schulte and Sider all understand the ontological free lunch doctrine in terms of theoretical economy. Notice, however, how these philosophers assume a particular answer to (Q): they each endorse the view that the ontological free lunch doctrine imposes a restriction on the principle of *ontological* economy – namely, Occam’s razor. The idea, according to these philosophers, is that Occam’s razor only applies to fundamental entities.

This view is naturally suggested by the phrase ‘ontological free lunch’. If the free lunch is ontological then it is natural to think that it has to do with the principle of ontological economy. But the shift from the claim that non-fundamentals do not affect theoretical economy to the claim that they do not affect ontological economy is not compulsory and it seems to me to be a bad idea.

Restricting Occam’s razor to fundamental entities is highly revisionary. Many entities posited in special-scientific theories – tectonic plates and black holes, for instance – are non-fundamental. This means, on the present proposal, that Occam’s razor should not apply to them. But Occam’s razor is normally taken to apply in biology and astrophysics, as well as to fundamental physics. Astrophysicists do not posit two or ten black holes if one will suffice to explain the behaviour of a spiral galaxy. This is as it should be – it would be absurd to criticise astrophysicists for appealing to Occam’s razor in their theories.

Ontological simplicity is an explanatory virtue so denying that Occam's razor applies to theories in the special sciences is tantamount to denying that theories in the special sciences are explanatory. This is absurd and also, it seems, contrary to the permissive spirit that drives the ontological free lunch doctrine. As deRosset (2010: 74) notes, one of the driving ideas behind the ontological free lunch doctrine is a kind of modesty: its defenders want to legitimise claims made in the special sciences (as well as ordinary discourse), by showing that the entities that these claims are committed to can be fitted in to a plausible metaphysic. But if special-scientific theories are not explanatory then there is no reason to believe them at all – no reason to make room for the entities that they posit.

The idea that ontological simplicity is an explanatory virtue raises another problem with the proposed restriction to Occam's razor. The problem is that the restricted Occam's razor tends to generate justificatory regresses and so it tends to render good questions unanswerable. To illustrate, imagine we are considering whether to posit F 's. Suppose there is some reason to believe in F 's but not an overwhelming reason. To make an informed choice, we need to work out whether the cost to ontological economy incurred by positing F 's outweighs the benefits that commitment to F 's brings to our theory. To make an informed decision we need to decide whether Occam's razor applies to them. Whether it does or not, on the present proposal, depends on whether F 's are fundamental or not.

Fundamentality is an explanatory concept and to work out whether something is fundamental we need to know whether facts about it can be metaphysically explained. So we have to consider various explanatory hypotheses, of the form: ' F 's exist because p '. But how are we to assess these explanatory proposals? Part of doing so will involve working out how they fare with respect to the explanatory virtues. But ontological simplicity is itself an explanatory virtue. So we have to work out how ontologically frugal the sentence that replaces ' p ' is. To do this in an informed way we need to know whether Occam's razor applies to the ontological commitments of *this* sentence. And on the present proposal, this means establishing whether the ontological commitments of this sentence are fundamental or not, which means assessing various explanatory hypotheses for *their* existence.

The regress will be stopped in exceptional cases: in cases where we are considering a posit that is justified regardless of whether Ockham's razor applies to it; and in cases where the explanans sentence we are considering has no ontological commitments. In cases where the posits involved at each step of the regress do not have these special features, we will not – on the present proposal – be able to make an informed choice about whether to believe the proposed existence claim!

This regress is brought about by repeated application of two methodological principles – the restricted version of Occam's razor and the principle that we should prefer explanations that are ontologically frugal. But we cannot reasonably deny the latter principle. At least, the defender of the restricted version of Occam's razor cannot. If ontological economy were not an explanatory virtue then there would be no reason to endorse it at all, even for fundamental entities. Why should it apply to them if the explanatory value of a theory is not partly determined by its ontological economy? The blame has to fall on the other methodological principle that generates the regress, namely the restricted principle of Occam's razor.

A final implausible consequence of the proposed restriction to Occam's razor is that it implies that theories without a fundamental level – that is, theories according to which all entities are grounded – are ontologically *maximally parsimonious*; they have the perfect profile as far as ontological economy is concerned. We should favour such theories as a matter of ontological economy, even though they posit a infinite number of entities. This is surely the wrong result.

We should reject the idea that Occam's razor only applies to fundamental entities. This removes the methodological underpinning of Schaffer's thesis of ontological permissivism, the view that many existence questions at issue in ontological debates are trivial because the entities whose existence is debated obviously do exist (Schaffer 2009: 356-62). Pace Schaffer, Occam's razor does apply to the existence claims under discussion – because it applies to all existence claims – and so there remains methodological pressure to reject the existence claims that Schaffer identifies.

4.5 Explanatory unification

We noted above that there are several orthogonal senses in which a theory might be economical. The fact that Occam's razor cannot plausibly be restricted to fundamental entities does not mean that there is *no* principle of theoretical economy that underpins the ontological free lunch doctrine; it only means that Occam's razor is not that principle. In this section I will argue that there is another principle which more plausibly underpins the ontological free lunch doctrine.

The proposal turns on the connection between fundamentality and explanation. Given that fundamentality is understood in terms of grounding, it follows that the existence and properties of non-fundamental entities can be metaphysically explained in terms of the existence and properties of fundamental entities. But the existence and properties of fundamental entities cannot be explained in terms of more basic entities – there are no more basic entities!

A vague but plausible idea is that a good-making feature of theories is that they exhibit a good explanatory structure – roughly, that they explain a lot and they do not entail many unexplained claims (for discussion of this principle see Forrest 2009; Hudson 2005: 12-13).

This idea is familiar from unificationist theories of explanation (see Friedman 1974; Kitcher 1989). Here is how Michael Friedman introduces the unificationist approach:

[S]cience increases our understanding of the world by reducing the total number of independent phenomena that we have to accept as ultimate or given. A world with fewer independent phenomena is, other things equal, more comprehensible than one with more (Friedman 1974: 15)

We should distance ourselves from the specific notions of unification that are used by Friedman and Kitcher. For Friedman, unification is understood in terms of an evidential notion of independent acceptability (Friedman 1974: 15-18). To unify a theory we reduce the number of independently acceptable laws used in explanatory derivations, where to say that L is independently acceptable relative to M means roughly that there is sufficient evidence to warrant acceptance of L that is not sufficient evidence to warrant M (Friedman 1974: 16). And Philip Kitcher understands unification in terms of the number (the lower the better) and what he calls the stringency (the higher the better) of argument patterns that used in explanatory derivations; these notions are broadly logical and semantical in character.

I will understand unification in terms of grounding: a unified theory is one which generates a rich superstructure of entities from a sparse fundamental base (see sect. 4.6). This means that the relevant notions of dependence and unification are metaphysical, rather than an epistemic, semantic or logical. Jaegwon Kim puts the point succinctly: “simplicity and unity are features of the events and facts of the world as well of our beliefs and propositions” (Kim 1994: 68). By postulating grounding relations, we reduce the number of metaphysically independent entities and phenomena that our theory is committed to. (It is a good question how questions of metaphysical independence bear

on the questions of dependence discussed by Friedman and Kitcher; see Kim 1994: sect. 5 for discussion).

With this idea in hand we can sketch the proposed vindication of the ontological free lunch doctrine. Postulating fundamental entities increases the number of unexplained claims that our theory entails. Some of these will be existence claims and others will be claims about the properties possessed by the fundamental entities. By contrast, postulating non-fundamental entities does not introduce unexplained claims to our theory because the existence and features of non-fundamental entities are metaphysically explained in terms of the existence and features of fundamental entities. This is the upshot of the connection between fundamentality and explanation. Although Occam's razor applies to fundamental and non-fundamental entities alike, the methodological principle that says that we should reduce the unexplained elements of our theory *does* discriminate between non-fundamental entities and fundamental entities and it favours the former. If F 's are non-fundamental then they may be said to be 'ontologically innocent' in the sense that claiming that F 's exist does not negatively affect the explanatory profile of the theory, because this claim is explainable. Moreover, this sense of ontological innocence is innocuous – anyone who agrees that theories should have the kind of explanatory profile I have characterized should agree that this concept of ontological innocence is intelligible. We might object to postulating grounding relations in the first place, but that kind of scepticism targets the theory of grounding generally (see chapter 2 for discussion). If we believe in grounding, the ontological free lunch doctrine, on the present understanding, seems included in the package.

4.6 The bang for the buck principle

It is instructive to consider a methodological principle that Jonathan Schaffer endorses, which he calls the 'bang for the buck' principle:

What one ought to have is the strongest theory (generating the most derivative [i.e. non-fundamental] entities) on the simplest basis (from the fewest substances [i.e. fundamental entities]) (Schaffer 2009: 361)

Schaffer himself proposes this principle as a replacement for Occam's razor. Instead of endorsing the general version of Occam's razor, which exerts pressure on us to minimise our ontological commitments, Schaffer thinks we should endorse a principle that puts pressure on us to reduce our fundamental ontological commitments while encouraging us to increase our non-fundamental commitments. This idea is even more implausible than the (weaker) proposal to restrict Occam's razor to fundamental entities, which we discussed in section 4.4. Schaffer's principle encourages us to have a bloated ontology of non-fundamentals. For instance, it would seem to imply that a theory that postulates seventeen black holes to explain the behaviour of a spiral galaxy is preferable, as far as the theory's ontology is concerned, to a theory that postulates just one black hole one. But this is absurd.

While the bang for the buck principle is not a plausible replacement for Occam's razor, it might plausibly sit alongside it. And I think that it is plausible, as long as it is construed as a principle governing the kind of explanatory structure that we should aim for in our theories. Any theory which has the kind of structure encouraged by the bang for the buck principle will be one which has a good explanatory profile: it will explain a lot and be committed to few brute facts.

We should distinguish qualitative from quantitative versions of the bang for the buck principle:

(B1) We should aim for a theory which generates many *kinds* of entity from a sparse basis of fundamental kinds of entity, where F is a fundamental kind if, and only if, all F s are ungrounded.

(B2) We should aim for a theory which generates many *particular* entities from a sparse basis of fundamental entities

Consider a debate between a priority monist (who claims that there is just one fundamental entity, the whole cosmos) and a priority atomist (who claims that mereological simples are fundamental; see Schaffer 2010 for defence of priority monism). According to (B2) priority monism has *much* better explanatory structure than priority atomism, since her theory claims there is just one fundamental entity whereas atomism claims there are (maybe infinitely) many. But if we opt for (B1) the matter is far less straightforward because it depends on the as yet open question of how many fundamental kinds of entity each theory has.

It seems to me that priority monism does not have a clearly better explanatory profile than priority atomism, in any methodologically significant sense. If this is correct then (B1) should be favoured. If we endorse (B1) we need an account of how this principle, which trades in kinds, puts pressure on the particular existence claims we endorse. Why should asserting that x is fundamental involve going against (B1), given that (B1) says nothing about particular entities like x ?

It is plausible that grounding is a lawlike relation (Audi forthcoming a: sect. 4; forthcoming b: sect. 3; Schaffer manuscript: sect. 1.2). Jonathan Schaffer describes the lawlike nature of grounding as follows:

[G]rounding is a lawful relation. If a grounds b , then there is presumably some feature F of a , and some feature G of b , such that generally F s ground G s. Thus one should expect general principles of what grounds what ... For instance, where \emptyset grounds $\{\emptyset\}$, there is the general principle that member grounds set. Where Socrates grounds the truth of \langle Socrates exists \rangle , there is the general principle that things ground truths of their existence (Schaffer manuscript: sect. 1.2).

A plausible corollary of this is the following rule about fundamentality:

(C) If anything x is fundamental then there is some property F , such that x is F and all F 's are fundamental (and F is not the property of being fundamental).

The qualification in brackets is to prevent (C) from being trivial. (C) says that any fundamental entity is an instance of a fundamental kind. (C) can be motivated by considering examples. For instance, if I claim that some electron e is fundamental then I should also accept that every electron is fundamental; it would be perverse to claim that e is fundamental but other electrons are not.

(C)'s bearing on the question raised a moment ago is plain to see. If (C) is correct then claiming that any particular entity x is fundamental commits you to claiming that there is a fundamental kind that x instantiates. In this way (B1) squeezes our fundamental ontology indirectly, via the fundamental kinds that particular existence claims commit us to. Note that (B1) only puts pressure on us to avoid claiming that an F is fundamental if we are not already committed to claiming that F -ness is a fundamental kind. If we have already paid the price of admitting F -ness as a fundamental kind, then adding a new fundamental F does not do further harm to the explanatory profile of the theory. In this way, even some fundamental entities are ontological free lunches, in the sense that they do not go against (B1).

The fewest fundamental entities or kinds that a theory can be committed to is zero. This means that (B1) and (B2) encourage us to endorse theories without fundamental entities. For instance, consider a debate between a priority atomist and a gunk theorist, who claims that every entity has proper parts. Assuming that entities are grounded by their parts, both (B1) and (B2) seem to imply that the gunk theory has a better explanatory structure than the atomist theory, because the gunk theory has no fundamental entities or kinds and infinitely many non-fundamental entities or kinds. This might seem odd but note that there is always countervailing pressure from Occam's razor to avoid these theories, since they are committed to infinitely many entities. (B1) and Occam's razor are plausible in tandem. We only run aground if we think that (B1) can do the work of Occam's razor.

4.7 Summary and conclusion

We have seen that we can make sense of the ontological free lunch doctrine in terms of theoretical economy. If we understand the ontological free lunch doctrine like this, we need to explain what kind of theoretical economy is relevant for the ontological free lunch doctrine. I have argued against the claim that commitment to non-fundamental entities does not count against the ontological economy of a theory (sect. 4.4). We saw in section 4.5 that there is a plausible principle about explanatory unification that discriminates between fundamental and non-fundamental entities. I have not given a detailed account of this methodological principle but it should be clear that this not just our concern. An account of this is independently desirable because the intuitive principle is so plausible.

On the account defended, non-fundamental entities come for free in the sense that that positing them does not damage the explanatory unity of our theory. This is a modest sense in which non-fundamentals are free. This version of the ontological free lunch doctrine does not support Schaffer's permissive approach to ontology, according to which most questions in ontology are trivial because the disputed entities obviously do exist. And we do not get epistemological free lunches of the kind Jonathan Schaffer promises:

Empiricist scruples . . . may be met if the entities in question are grounded.
For instance, if numbers are indeed grounded in the concrete realm, then . . .
they may be known via their concrete grounds (Schaffer 2009: 361).

Then again, I do not see any reason to expect that invoking grounding will solve epistemological problems like this and it is far from clear how Schaffer intends to make good on this promise.

Chapter 5

Relata

5.1 Introduction

In chapter three we discussed the ontological roles that the grounding relation can play and in this chapter I will focus on two of these roles – grounding’s role in the theory of the determination relations and its role in the theory of explanation. It will emerge that these roles constrain our account of the relata of grounding. My aim in this chapter is to discuss what sorts of entity the grounding relation has to stand between, if it is to play these ontological roles.

A central question in the metaphysics of grounding is this: What kinds of entity stand in the grounding relation?¹ The *flat theory* is the thesis that grounding relates entities belonging to a single ontological kind. The *dimensioned theory* is the thesis that grounding relates entities belonging to different kinds.

To focus the discussion, I will focus on the leading version of the flat theory, according to which grounding relates *facts*. I will call this theory the ‘fact theory’. The fact theory is defended by Paul Audi (forthcoming a; forthcoming b) and Gideon Rosen (2010). I focus on this theory because it is the best articulated and most promising version of the flat theory to have emerged in the debate. The dimensioned theory is defended by Jonathan Schaffer (2009: 375-6; manuscript).

I will begin (sect. 5.2) by outlining the fact theory, focussing on the theories of Paul Audi and Gideon Rosen (these are the leading defenders of the fact theory). Section 5.3 argues that if grounding only relates facts then it is unlikely that we can appeal to grounding in the theory of the determination relations. We should endorse the dimensioned theory, if grounding is to play this role. Then in section 5.4 I argue that the fact theory does not provide a plausible metaphysical basis for non-causal explanations, arguing that the dimensioned theory is preferable.

The upshot is that the fact theory risks being unmotivated, because the relation it describes is not fit to play (some of) the ontological roles that grounding plausibly plays. Fact theorists might intend grounding to play different theoretical roles. The discussion in this chapter would, in that case, only show that there are some theoretical roles the fact theory is not suited to. In section 5.5 I raise some serious problems for the dimensioned theory, to be addressed in the next chapter.

¹As noted in chapter 1: sect. 1.6.5, this talk of ontological kinds should not be taken to imply a controversial Aristotelian thesis.

5.2 The Fact theory

The fact theory says that the grounding relation holds between facts. I use ‘fact’ and ‘state of affairs’ interchangeably. The most prominent contemporary defender of an ontology of facts is David Armstrong (1997), although facts feature prominently in discussions of logical atomism (see, e.g., Russell 1956).

Believers in facts usually denote (or purport to denote) facts using complex singular terms obtained by applying the sentence-nominalising functor ‘the fact that’ to declarative sentences, and I follow this convention here. The resulting singular terms have the form ‘the fact that p ’. I continue to follow the convention of abbreviating these singular terms using square brackets. For instance, ‘the fact that roses are red’ is abbreviated by ‘[Roses are red]’.

Given this manner of denoting facts, we can state straightforward necessary and sufficient conditions for a fact’s existence:

[p] exists if and only if p

That is,

[Fa] exists if and only if Fa

[Rab] exists if and only if Rab

etc.

Denoting facts in this way helps bring out their internal structure. Armstrong tells us that facts have ‘propositional structure’ (Armstrong 1997: 3). This claim is not entirely perspicuous. One thing it suggests is that facts have *constituents* and I will assume that this is the case. Moreover, I assume, with Audi and Rosen, that facts can have *particulars* and *properties* (including relations) as constituents. For instance, [Fa] has the particular a and the property F -ness as constituents and [Rab] has the relation R and a and b as constituents.

Facts are to be distinguished from mereological sums. The mereological sum of a and F -ness exists (according to classical mereology) if and only if a and F -ness exist. But this is not enough for [Fa] to exist. For this fact to exist, a must be F . Facts therefore have a non-mereological kind of structure (a feature that Lewis famously bemoans: see Lewis 1992: 213).

Facts, as I use the term, are also to be distinguished from true propositions. They are entities that, according to many truthmaker theorists, make propositions true.

Believers in facts must tell us how abundant the facts are. There is a spectrum of views, ranging from *sparse* to *abundant*, with sparse theories claiming that fewer facts exist and abundant theories claiming that more facts exist. Historically the abundant theory of facts is associated with G. E. Moore (Moore 1953: 256) and the sparse theory with logical atomists (e.g. Russell 1956).

In the grounding debate, Audi marries the fact theory with a sparse theory of facts and Rosen with a more abundant theory. Audi and Rosen agree that objects and properties can be constituents of facts but they disagree about whether other items can also be constituents of facts. Audi denies that they can and in this respect his theory is sparse – he only believes in facts that have objects and properties and predicative structure (Audi forthcoming a: sect. 2). This claim about the kind of structure that facts have seems to rule out facts of the forms [$\exists x(Fx)$] and [$p \vee q$]. Facts of these forms do not appear to have a particular-property structure – they have structure corresponding to the logical

complexity of existential generalization and disjunction. Whatever structure this is, it seems not to be particular-property structure.²

Rosen, by contrast, allows that connectives and quantifiers can be constituents of facts (Rosen 2010: 114) and he thinks that there are facts of the forms $[\exists x(Fx)]$ and $[p \vee q]$ exist (Rosen 2010: 117). Indeed, Rosen thinks that recognizing these facts is crucial for bringing out relations between grounding and the logical connectives and quantifiers, for he thinks that disjunctions and existential generalizations are grounded by their true disjuncts and are grounded by their instances.

I will, for simplicity, assume that the fact theory says that grounding is a dyadic relation between facts. In fact, this is rejected by Audi (forthcoming b: sect. 4) and Rosen (2010: 115), who both take grounding to be a one-many relation – that is, both think there are cases in which single facts are grounded by several facts taken together. The discussion in this chapter will be broad enough that this simplification will not be harmful.

5.3 The fact theory and the determination relations

In chapter 3 (sect. 3) we saw that the grounding relation provides candidate explanations of why the determination relations have various features. We also saw there that at least some of these grounding-based explanations – namely the identity thesis and the determinable thesis – require the dimensioned theory of grounding. This is because if the determination relations are identified with the grounding relation, or if they are treated as determinates of the grounding relation, then grounding has to relate the same things as the determination relations (given plausible views about identity and the determinate-determinable relation). But the determination relations are not restricted to holding between a single ontological kind.

It seems to me that there is reason to believe the stronger thesis that *no candidate explanation* in terms of grounding is compatible with the fact theory. For the grounding relation to explain the relevant features of the determination relations, the grounding relation must be suitably related to the determination relations. Grounding must be related to the determination relations in such a way that the determination relations inherit the relevant properties of the grounding relation. How can the fact theorist implement this explanatory strategy?

There is a logical and an ontological aspect to this challenge. The logical aspect of the challenge is to provide a set of principles connecting grounding to claims about the determination relations, like the following, where R_1 and R_2 denote determination relations:

If x bears R_1 to y then $[p]$ is grounded by $[q]$

If x bears R_2 to y then $[r]$ is grounded by $[s]$

...

The ontological aspect is to provide an account of the relation between the grounding relation and the particular determination relations, $R_1 R_2 \dots$, which explains why these connections obtain. It is difficult to see how the fact theorist can address either aspect of this challenge. It is difficult to see what systematic expansion principles the fact theorist could appeal to in order to go from claims of the form ‘ x bears R_1 to y ’ to claims of the

²Here I assume that $[\exists xFx]$ is not identical with $[F\text{-ness is instantiated}]$. Audi could consistently believe in existential facts if he thinks that they are identical with facts about the instantiation of properties.

form ‘ $[p]$ is grounded by $[q]$ ’. For instance, it will not do to construe the facts in these principles as existence facts, as follows:

If x bears R_1 to y then $[x$ exists] is grounded by $[y$ exists]

On even a modest estimation of the variety of determination relations, this will work in some cases but not others. It works for set membership: it is plausible that if $\{x\}$ bears the converse of the set membership relation to x then $[\{x\}$ exists] is grounded by $[x$ exists]. But not all determination relations correspond with existence explanations. The realization relation is a good candidate for being a determination relation. If realization is a relation between properties (this is widely accepted: see Morris 2010: 394), we might want to say that some neural property N realizes mental property M . But it is not at all obvious that we want to say that the existence of M is grounded by the existence of N . What fact theorists want to say, rather, is that the *instantiation* of M , on a given occasion, is grounded by the instantiation of N . There does not seem to be a systematic way of generating connecting principles between grounding and the determination relations and this casts doubt on the idea that there is a systematic relation between grounding and the determination relations.

This impression is borne out when we try to address the ontological aspect of the challenge. According to the fact theory, the extensions of grounding and the determination relations differ radically. Fact theorists think that grounding only relates facts but it seems clear that the determination relations are not restricted in this way. For instance, the set membership relation always holds between a set on the one hand and the elements of the set on the other; the realization relation is often said to stand between properties; and the mereological summation relation holds between mereological sums and their parts. For the fact theorist, grounding only relates facts. So the extension of the grounding relation is radically different from the extensions of (many of) the determination relations. And it is radically different from the combined extensions of all the determination relations together.

This raises the question: How can the fact theorist understand the relation between grounding and the determination relations? It cannot be a very intimate relation like identity or the determinate-determinable relation, because that would imply that if x stands in a determination relation to y then x is grounded by y , which would be inconsistent with the fact theory (see chapter 3 sect. 3.3). The fact theorist needs an account of the relation between grounding and the determination relations which (i) allows that the extensions of these relations differ radically but (ii) implies that the relation between grounding and the determination relations is intimate enough for the determination relations to inherit the relevant features from the grounding relation. It is difficult to see how the fact theorist could develop such an account. It is therefore doubtful that the fact-theoretic relation of grounding provide materials for explaining why the determination relations have the properties they do.

The dimensioned theorist has none of these problems. Because she allows that non-facts stand in the grounding relation, she can endorse connecting principles of the following form,

If x bears R_1 to y then x is grounded by y

And, in explaining the ontological relation between grounding and the determination relations, she is free to identify the determination relations with the grounding relation or to argue that the grounding relation is a determinable property with the determination relations as determinates (see chapter 3: sect. 3.3). She can develop promising explanatory proposals that the fact theorist cannot replicate.

5.4 The fact theory and explanatory realism

In chapter 3 (sect. 2) I said that one reason for believing in the grounding relation is that it plays a role in the metaphysics of explanation. I suggested that grounding relations might be introduced to satisfy the intuition that explanations track worldly relations (this is the thesis of explanatory realism). In this capacity, instances of grounding relations are supposed to be the metaphysical features that explain why the non-causal explanations (in some specified class) obtain. So for any explanation ‘ p because q ’ in the relevant class, there should be some grounding claim r such that $(p$ because $q)$ because r (see Audi forthcoming a: sect 3).

This is grounding’s explanatory role in the the context of explanatory realism. Explanatory realism is the centerpiece of Audi’s argument for grounding (Audi forthcoming a: sect. 3). I will particularly be concerned with Audi’s view here.³

Explanation is expressed by the sentential connective ‘because’ – to get a well-formed explanation we need sentences to fill the blanks in the schema ‘... because ...’. It seems clear that grounding must be closely connected to explanation if it is to play the proposed role in the theory of explanation. In particular it is plausible that instances of grounding must necessitate the truth of whatever explanations they correspond with.⁴

The fact theory has the attractive feature that there are plausible and obvious connecting principles between fact-theoretic claims of grounding and claims of explanation. It is easy to connect grounding to explanation if grounding is a relation between sententially structured entities like facts.

Take a true fact-theoretic grounding claim: [The vase is fragile] is grounded by [Its constituent atoms $a_1 \dots a_n$ are arranged Φ -wise]. It is overwhelmingly natural to think that this grounding claim entails the explanation: The vase is fragile because its constituent atoms $a_1 \dots a_n$ are arranged Φ -wise. More generally, the following connecting principle is very plausible, given the fact theory:

(1): For any facts $[p]$ and $[q]$, if $[p]$ is grounded by $[q]$ then p because q

(1) enables us to read off from any given grounding claim an explanation it entails and, according to explanatory realists, makes true.

Does the fact theory correctly identify the metaphysical features that underpin explanations? Consider again the explanation:

(2) The vase is fragile because its constituent atoms $a_1 \dots a_n$ are arranged Φ -wise

I take it that, according to the fact theory, (2) is true because the following instance of grounding obtains:

(2*) [The vase is fragile] is grounded by [The vase’s constituent atoms $a_1 \dots a_n$ are arranged Φ -wise]

According to the fact theory, (2*) has explanatory priority over (2). Is this claim plausible?⁵ I think it is far from evident. Grounding claims, on the fact theory, are very similar

³Rosen does not commit to explanatory realism but if his theory were co-opted by explanatory realists, our discussion would apply to it.

⁴This claim is similar to the claim – widely accepted in the debate about truthmaking – that truthmakers necessitate their corresponding truths; see Armstrong 1997: 116.

⁵It is worth mentioning one possible reason to deny the priority of (2*) over (2), although I am not sure how persuasive it is. There is a philosophical tradition, deriving from Peter Strawson, according to which facts are, in some sense, abstractions from true statements (Strawson 1950: 133-43). This Strawsonian theme has recently been taken up by Benjamin Schnieder (2006a: 39-42), who argues that substitution instances of the following explanation schema are true, where ‘ p ’ is replaced by a truth: $[p]$

to the explanations that they are supposed to make true. (2*) looks a lot like a syntactic transformation of (2), albeit one that renders (2) more metaphysically contentious by including reference to facts. But syntactic transformation is not metaphysical explanation. Grounding relations are, according to the explanatory realist, deep explanatory features that underpin explanation. But we should not expect that syntactic transformations of explanations will reliably yield a description of these deep explanatory features; that just seems too good to be true.

The fact theorist needs to persuade us that the grounding claims she postulates really do have explanatory priority over the target explanations. But even if this is granted, there is a problem with the idea that grounding relations, as the fact theorist construes them, have a significant role to play in the metaphysics of explanation. The problem is that there are explanatory phenomena that grounding between facts does not account for and for which explanatory realists are likely to want a metaphysical explanation. This means that further facts need to be postulated to explain these phenomena and the worry is that these facts seem to suffice, on their own, to do all of the metaphysical work we need doing. If this is correct then the fact-theoretic relation of grounding becomes a side show, playing no significant role in the metaphysics of explanation. Fact theorists therefore cannot appeal to grounding's allegedly indispensable role in the metaphysics of explanation to motivate postulating grounding relations (pace Audi forthcoming a: sect. 3).

To see the problem, consider the following pair of claims about a scarlet ball r :

(3) r is red because r is scarlet

(3*) [r is red] is grounded by [r is scarlet]

(3) is an instance of a general pattern of explanation – *any* scarlet thing will witness the following generalization, where ‘ S ’ and ‘ R ’ stand for scarletness and redness respectively (compare Audi forthcoming a: sect. 5; Rosen 2010: 126):

(4) $\forall x(Sx \rightarrow Rx$ because $Sx)$

It is reasonable to want to explain generalizations like (4). But (3*) does not explain (4); (3*) accounts for a particular instance of the generalization but it does not explain the generalization, because it only concerns r 's redness, saying nothing about redness or scarletness generally. It is natural – and in keeping with the explanatory realist's project – to appeal to some relation between the properties, redness and scarletness to explain (4).

To put the problem in a schematic form, let us call the facts postulated to explain explanatory generalizations like (4) – whatever facts these are – ‘the facts*’. Then the question for the fact theorist is this: Do the facts* explain why particular metaphysical explanations obtain, in addition to explaining why explanatory generalizations like (4) obtain? If they do, then there is a real worry that the facts*, not the fact-theoretic grounding relations, underpin metaphysical explanation. Fact-theoretic grounding relations would be redundant in the metaphysics of explanation, since their role is played by the facts*.

Audi (forthcoming a: sect. 4) postulates a relation he calls *essential connection* that obtains between the properties being scarlet and being red:

exists because p . If Schnieder is right about this, it starts to look odd to say that (2*) has explanatory priority over (2). If [p] exists because p and [q] exists because q , then it seems implausible that a relation between [p] and [q] could explain why it is the case that p because q . By way of analogy, {Socrates} exists because Socrates exists and {Plato} exists because Plato does. This is surely part of the reason why it is implausible that we can explain facts about Plato and Socrates in terms of relations between {Plato} and {Socrates}.

Grounding is importantly tied to the natures of properties. Whether two facts are suited to stand in a grounding relation depends heavily upon what properties are involved in those facts. Facts involving redness and loudness, for example, never stand in grounding relations with one another. Nothing could be red in virtue of being loud, or loud in virtue of being red (and no range of intermediaries could ever link them together in a chain of grounding). These properties are simply too disparate. Compare maroonness. The fact that a thing is maroon is bound to ground its being red (assuming, for the moment, that a given thing's redness is not identical with its maroonness). To label this relationship, let us say that facts are suited to stand in a relation of grounding only if their constituent properties are essentially connected (Audi forthcoming a: sect. 4).

Audi does not say much to elucidate the notion of essential connection, but it seems just the sort of thing that we need to explain generalisations like (4). On this line, being red and being scarlet are essentially connected, which is why, in general, the redness of a scarlet thing is explained in terms of its scarletness. By contrast, being red and having mass two kilograms are not essentially connected, which is why we cannot, in general, explain a thing's redness in terms of its having mass two kilograms.⁶

Audi's metaphysics of explanation consists of two different worldly structures: there is a structure of facts generated by grounding relations and there is a structure of properties generated by relations of essential connectedness. These structures seem to play different roles. As I understand his theory, instances of the grounding relation underpin particular explanations whereas instances of essential connection provide a coarse-grained explanatory structure that emerges from the fine-grained grounding structure. Contours emerge from the fine-grained structure: all facts of the form [x is scarlet] ground a fact of the form [x is red], for instance. As I understand it, Audi's notion of essential connection is supposed to map these contours.

How does Audi think these structures are related? It might seem as though facts about what ground what are grounded by facts about essential connection. Audi's use of 'depends' in the second sentence of the passage just quoted suggests this view. But it would be bad news for Audi if instances of essential connection explain facts about what grounds what. If this were the case then it would be unclear why we need the grounding relation at all. Surely we could just postulate the relation of essential connection – if instances of essential connection explain why instances of grounding obtain then surely they explain everything that grounding relations explain: whatever explanatory work grounding plays could also be played by the more fundamental relation of essential connection.

Audi gives a different reason for denying that facts of essential connection ground facts about grounding – although he grants that the claim that facts about grounding are grounded by facts about essential connection is initially attractive (forthcoming b: sect. 3). He argues that if facts about the essential connectedness of properties explain or ground particular facts about grounding then a troubling regress is generated: “we immediately face the threat of regress and a proliferation of iterated facts about essential connection” (forthcoming b: sect. 3). And other authors have suggested that the idea that grounding is grounded involves a problematic regress or circularity – as Schaffer puts it, if grounding is grounded, then it must somehow “bootstrap itself into being” (Schaffer manuscript: sect. 3.4; see also Bennett 2011b).

⁶Kit Fine (forthcoming a: sect. 11) and Gideon Rosen (2010: sects. 12 and 13) offer similar proposals, which appeal to the concept of essence. On Rosen's view (2010: 130), (4) is true because of facts about the essence of the property redness. And he cites similar essentialist facts to explain other explanatory generalizations as well.

How does the claim that facts about what grounds what are grounded by facts about essential connections generate a regress? Suppose the fact that redness and scarletness are essentially connected – [EC (Redness, scarletness)] – grounds (3*). This is expressed by the following claim:

- (5) [[r is red] is grounded by [r is scarlet]] is grounded by [EC (redness, scarletness)]

What grounds (5)? We might, of course, think that some instances of grounding are not grounded by facts about essential connectedness – that some facts about grounding are grounded by facts of essential connectedness while others are fundamental or grounded in something else. But Audi accepts that all instances of grounding correspond with instances of essential connectedness: “it is a necessary condition of one fact’s grounding another that the natures of the properties involved be [essentially connected]” (Audi forthcoming b: sect. 3). If, in general, facts of essential connection ground facts of grounding then it follows that (5) is itself grounded by a fact about essential connectedness.

The obvious candidate for grounding (5) is a fact stating that the relation of essential connectedness is essentially connected to the grounding relation: [EC (EC, grounding)]. So the next step of the regress is:

- (6) [(5)] is grounded by [EC (EC, grounding)]

On the view under consideration (6) is, in turn, grounded by a fact about essential connectedness. But no new fact is required to explain (6): [EC (EC, grounding)] is all we need to ground (6) because the main predicates of the facts standing either side of (6) denote the essential connectedness relation, on the one hand, and the grounding relation on the other.

[EC (EC, grounding)] stops the proliferation on one side of grounding claims – namely the side which describes the facts doing the grounding. But there is still an infinite hierarchy of facts being grounded. So we have not stopped the regress or shown it to be unproblematic – it still involves an infinite series of facts about what grounds what (and this infinite series is not identical with the series of existence facts that fact theorists are presumably committed to independently of the present discussion: [p], [[p] exists], [[[p] exists] exists]. . .).

I am prepared to grant Audi the conditional: if we recognise both grounding and the relation of essential connection, we should deny that facts of essential connection ground facts of grounding. But is Audi right to recognise both relations – to postulate two distinct metaphysical structures in the metaphysics of explanation? I find this aspect of Audi’s theory unparsimonious. The intuitive picture that explanatory realism starts with is a two level picture, according to which explanations track worldly facts. Audi splits the worldly element of this intuitive picture into two distinct explanatory structures and I am not convinced that both are needed. If we introduce an explanatory relation between constituents of facts to account for explanatory generalizations like (4), why do we need an explanatory relation between whole facts in addition – do we not already have ontology enough to underpin the relevant explanations? If we accept that redness and scarletness are essentially connected, why not think that this fact explains the generalization (4) *and also* that it explains each instance of the generalization? (We will see a possible reason in sect. 5.5).

Audi takes the structure of essentially connected properties to constrain the grounding structure, since he thinks that “[i]t is a necessary condition of one fact’s grounding another that the natures of the properties involved be [essentially connected]” (Audi forthcoming b: sect. 3). Assuming that this is not a contingent feature of the grounding relation, it seems that Audi is committed to necessary connections between instances of essential connection

and instances of grounding. Unless these necessary connections can be explained in some way, this would seem to be an additional cost to his framework.

So far we have questioned whether claims of the form $[p]$ is grounded by $[q]$ have explanatory priority over explanations. And we have criticised Audi's metaphysics of explanation because it seems unparsimonious and because it seems committed to necessary connections between instances of grounding and instances of essential connection. There are more simple-minded objections to his theory as well.

(7) {Socrates} exists because Socrates exists.

Ask yourself: what metaphysical fact explains why (7) obtains? It seems to me that the most natural answer is that (7) is underpinned by a relation between Socrates and {Socrates}.⁷ (7) contrasts with (3) which seems to be underpinned by a relation between the properties, scarletness and redness. There seems to be an interesting difference between (7) and (3): the metaphysical relation that underpins (7) is between the entities denoted by the terms at subject position in the explanans and explanandum sentences whereas, in (3), the relevant relation seems to be between the properties – the entities denoted at predicate position in the explanans and explanandum sentences. But according to the fact theory, the relations that underpin these explanations all obtain at the level of whole facts. The fact theory seems to obliterate an intuitive difference between these cases.

A different sort of case is illustrated by the following example:

(8) Diamond d is hard because d 's constituent atoms $a_1 \dots a_n$ are X

Intuitively (8) contrasts with claims like (3) and (7). In (7), the predicate 'exists' recurs on each side of the explanation and in (3) the subject ' r ' does. But in (8), neither subject nor predicate remains fixed on each side of the explanation. I will call cases like this 'mixed cases'.⁸

The metaphysical underpinning of (8) is intuitively more complex than that of (3) or (7). In (8), a property of an entity is said to depend on the instantiation of some *different* property by *different* things. It is natural to think that mixed cases involve two separate instances of grounding – one between the properties that they involve and another between the particulars. Again, the fact theory assimilates (8) to the other cases and fails to capture the worldly structure that is, intuitively, relevant for explaining (8).

The fact theorist might deny that there are any important differences between these cases or seek to explain them in terms of something other than grounding (something like Audi's notion of essential connectedness would do). But grounding was advertised as the worldly relation that non-causal explanations track. It was introduced to satisfy the intuition that explanation is never brute. The relation that intuitively underpins explanations like (3), (7) and (8) holds between constituents of facts rather than whole facts. If you insist that grounding only happens at the level of whole facts then it seems your account fails to accommodate compelling intuitions about which worldly features account for the relevant explanations. This being the case, I do not see why we grounding between whole facts is needed: if this relation does not satisfy our realist intuitions about what facts particular explanations depend on, what is it needed for?

⁷We said in chapter 3 sects. 3.2.2 and 3.3 that the relation of set-membership on its own will not do – we need to *explain why* set membership has anything to do with explanation.

⁸This way of introducing mixed cases is somewhat misleading: mixed cases are not distinguished by their grammatical form, although this is often an indicator. We could rephrase (8) so that a single subject appears on both sides, by using 'has constituent atoms $a_1 \dots a_n$ that are X ' as a monadic predicate which we apply to d . In this way we assimilate (8) to (3). But this is a superficial assimilation – the important difference between (8) and (3) is that the latter is underpinned by two relations, or so I will argue; and this difference is not destroyed by changing (8)'s grammatical form.

It is worth dwelling a little more on mixed cases, since we will return to them later (chapter 7: sect. 7.5.3). I take (8) to involve a grounding relation between the diamond d and its constituents in addition to a grounding relation between the properties hardness and X -ness. Why do we need both grounding relations? The answer is that it is only by recognizing both that we can explain the explanatory generalisations that accompany (8). The grounding relation between the properties hardness and X -ness, explains why *any* entity whose constituents instantiate X -ness are also hard – and such that their hardness is explained by their constituents’ being X . It explains a certain instance of supervenience: why necessarily an X -duplicate of d is also a hardness-duplicate of it.

What explanatory role is played by the grounding relation between the particulars, d and $a_1 \dots a_n$? One of the distinctive features of mixed cases is that the properties of one thing or class of things is said to depend on the (different) properties of distinct entities. But it is obvious that one cannot explain a thing’s properties in terms of the properties of *just any* other entities. You cannot explain the properties of the Moon in terms of the properties of a speck of dust in Alpha Centauri. This raises the question, why are d ’s properties explained in terms of those of $a_1 \dots a_n$? And, more generally, under what conditions do the properties of a class of individuals explain the properties of a distinct class of individuals?

Explanatory realists will answer this question in metaphysical terms. As Ruben puts it, “objects or events in the world must really stand in some appropriate ‘structural’ relation before explanation is possible” (Ruben 1990: 210). We can expect explanatory realists to diagnose the lack of explanatoriness in the Moon-speck case as being due to the lack of an appropriate metaphysical relation.

In mixed cases, the grounding relation at subject position connects the two classes of objects and thereby explains why the one class is relevant in explanations of the other – why the properties of *these* objects (e.g. $a_1 \dots a_n$) are relevant for explaining the properties of *these* objects (e.g. d). Once we know that d is grounded by $a_1 \dots a_n$ it should come as no surprise that the properties of the latter determine those of the former. The grounding relation between d and $a_1 \dots a_n$ mediates explanations of d ’s properties in terms of those of $a_1 \dots a_n$.

It is worth remembering grounding’s analogy with causation at this point. It is very natural to think that causal relations play this mediating role in causal explanations. Some of the properties of the famine – its duration and location, for example – are explainable in terms of the properties of the flood – the time of year it occurred and the pollutants in the water. The relevance of facts about the flood for explaining facts about the famine has to do with the fact that the latter is part of the former’s causal ancestry, or so it is very natural to think (Kim 1994: 67 highlights this analogy).

We will see, in chapter 7, that this treatment of mixed cases potentially has significant consequences for the logic of grounding (we will see that it apparently undermines certain irreflexivity and transitivity claims about grounding). For now, the moral is that some explanations are plausibly underpinned by relations between properties, others by relations between individuals, and others by both.

5.5 Problems for the dimensioned theory

My view is that grounding between facts is a gratuitous addition to the metaphysics of explanation – the metaphysical relation that accounts for explanations (in many cases at least) obtains between constituents of facts rather than whole facts. This view is more parsimonious than the fact theory. And it is, in many cases, just plausible that non-causal explanations are underpinned by relations between constituents of facts.

Audi might argue that we cannot eliminate grounding between facts in favour of

grounding between constituents of facts, for the following reason: if grounding relates constituents of facts then it generates a coarse-grained structure over properties and particulars. But we need a fine-grained structure of facts to account for *particular* explanations. For example, we cannot account for particular explanations of the form ‘ x is red because x is scarlet’ in terms of the *general* fact that redness is grounded by (or essentially connected with) scarletness. This general fact does not mention any particulars and so it is unclear how it bears upon particular explanations. For example, the fact that redness is grounded by scarletness does not, by itself, imply that x is red because x is scarlet – these properties would surely still be grounded even in worlds which lack x (after all, there might be other explanations of redness in terms of scarletness for this instance of grounding to underpin). So how can we explain why this particular explanation obtains in terms of this fact about redness and scarletness?

This is an instance of a serious and general challenge that faces the dimensioned theory. The challenge has to do with connecting the dimensioned-theoretic notion of grounding with concepts of necessity and explanation.

Grounding is closely related to explanation and necessity – at least, it had better be if grounding claims are to explain the modal and explanatory phenomena that they are supposed to explain. Whatever drawbacks the fact theory has, it at least allows for straightforward connecting principles between grounding and explanation and necessity:

If $[p]$ is grounded by $[q]$ then p because q

If $[p]$ is grounded by $[q]$ then it is metaphysically necessarily that if q then p
(compare Rosen 2010: 118)

These principles make the modal and explanatory implications of grounding claims very clear.

It is not clear how the dimensioned theorist can replicate these principles. De dicto modality and explanation both operate at the sentential level – without sentences or sententially structured entities like facts, how can we connect grounding to these concepts? Grounding is supposed to be integrated into the family of modal and explanatory concepts. It is therefore reasonable to expect that grounding theorists be able to state the relations between grounding and modal and explanatory concepts. The worry is that dimensioned theorist cannot do this.

To see the problem, consider the following dimensioned-theoretic grounding claim:

(9) Socrates is grounded by his constituent atoms $a_1 \dots a_n$

Dimensioned theorists think that the relation reported by (9) underpins a host of explanations of Socrates’ properties in terms of those of his parts. But there is no way of reading these explanations off (9) (Trogon forthcoming: sect. 3). Generally speaking, there seems to be no systematic way of inferring explanations from a grounding claim of the form ‘ x is grounded by $y, z \dots$ ’. Explanations take the form ‘ \dots because \dots ’. We need *sentences* to fill these blanks – and there seems to be no systematic way of transforming singular terms in grounding claims into sentence that figure in explanations corresponding with those grounding claims.

The dimensioned theory has similar problems specifying the relation between grounding and necessity. It is plausible that grounding is related to necessity (Rosen 2010: 118). But how can we go from sentences of the form ‘ x is grounded by y ’ to sentences of the form ‘it is necessary that p ’? The following expansion principle is unacceptable:

(10) For any x and for any $y, z \dots$ if x is grounded by $y, z \dots$ then it is necessary that if $y, z \dots$ exist then x exists

This would rule out (9) because it is not necessary that if $a_1 \dots a_n$ exist then Socrates exists – there are worlds in which $a_1 \dots a_n$ exist (perhaps scattered across the Milky Way) without Socrates.

The grounding theorist faces a sceptical pincer movement. On the one hand, she needs to establish that grounding has an important theoretical role to play; otherwise enthusiasm seems unmotivated. Our discussion of grounding's role in the theory of explanation (sect. 5.4 of this chapter) and in the theory of the determination relations (sect. 5.3 of this chapter) suggests that the grounding relation should be understood dimensioned-theoretically. On the other hand, we need assurance that grounding is fit to play these roles. This seems to require systematic connections between the concept of grounding and the concepts of explanation and necessity. Yet we have just seen that dimensioned theorists have problems specifying these connections.

A sceptical moral that might be drawn is that grounding is confused: its theoretical roles require that grounding is at once a relation between facts and also that it is not a relation between facts. So there is no coherent account of grounding available. In the next chapter I will argue that this sceptical conclusion is premature. To do this I will outline a strategy that enables dimensioned theorists to mimic the fact-theoretic connecting principles between grounding and explanation and necessity that we have just discussed.

5.6 Summary and conclusion

Let us summarise our findings. One good reason for believing in the grounding relation is that it enables us to explain why the determination relations share a common core of features. But in sect. 5.3 we saw that it is unlikely that grounding relation can do this, if it only holds between facts.

In section 5.4 we discussed the fact theory in the context of explanatory realism. We saw that an explanatory relation between constituents of facts is needed to account for explanatory generalizations. But it is extravagant to postulate two explanatory relations – one between whole facts and one between constituents of facts. And the metaphysical facts that intuitively underpin explanations are, in many cases, relations between constituents of facts. But the grounding relation is supposed to be the relation that underpins metaphysical explanations. So the claim that grounding is a relation between facts is implausible.

But we have just seen that the claim that constituents of facts can stand in the grounding relation is problematic, because it makes specifying the relation between grounding and necessity and explanation difficult. But specifying these relations is crucial if we are to establish that grounding has a role to play in the theory of explanation, and in explaining supervenience relations. In the next chapter I outline a strategy that dimensioned theorists might pursue to address this problem.

Chapter 6

A Lewisian fix

6.1 Introduction

We ended the previous chapter with a problem. On the one hand we saw there is good reason to think that, in some cases, individuals and properties stand in the grounding relation. These considerations led us to reject the view that grounding only relates facts. We were led to endorse dimensionalism, the view that the grounding relation can hold between entities belonging to different ontological categories.

On the other hand we saw in section 5.5 of the last chapter that dimensionalism is problematic because it is unclear, given the dimensionalist's account of the relation of grounding, how to specify the relations between grounding and neighbouring concepts of metaphysical necessity and explanation. The worry is that, on the dimensionalist account, grounding is disconnected from the concepts of necessity and explanation. But how can grounding play a useful role in explaining modal and explanatory phenomena, if the modal and explanatory implications of grounding claims are unclear?

This is a serious problem for dimensionalism. It might make you draw the sceptical conclusion that no theory of grounding vindicates enthusiasm: *either* we are fact theorists, in which case grounding is unfit to explain the relevant phenomena, for the reasons given in sections 5.3 and 5.4 of previous chapter, *or* we are dimensioned theorists in which case grounding is unfit to explain the relevant phenomena, for the reasons just mentioned.

In this chapter I defend the dimensioned theory by responding to the problems just outlined. In particular, I will outline a theory of grounding that is both consistent with the dimensioned theory and also that allows us to provide general principles connecting grounding to explanation and metaphysical necessity. By doing this, I hope to show that a dimensioned-theoretic account of the grounding relation does not prevent us from integrating the concept of grounding into the family of modal and explanatory concepts. So drawing the sceptical conclusion considered a moment ago would be premature.

I will develop a version of the dimensioned theory deriving from Lewis's *things qua truthmakers* approach to truthmaking, which he defends in Lewis 2003. Echoing Lewis, I will use the slogan 'things qua grounders' to refer to this proposal. The possibility of using Lewis's approach in the context of the theory of grounding has been mentioned by Carrie Jenkins (2011: 7), although she does not defend the view herself.

There are similarities between the dialectical contexts in which the two proposals are made. Lewis made his proposal to avoid positing states of affairs as truthmakers. Similarly, I want to avoid the claim that grounding is a relation between states of affairs. The proposed account of grounding has some heavyweight commitments. Most notably, the semantics given to grounding claims presupposes Lewis's counterpart theory of de re modality. But our account of the grounding *relation* – that is, our metaphysics of grounding – is not counterpart-theoretic. The combination of a broadly counterpart-

theoretic semantics for grounding claims and the dimensioned theory's account of the grounding relation offers the virtues of the fact theory while avoiding its vices.

Commitment to counterpart theory will strike some as an objectionable feature of the proposal. The proposal is an instance of a general strategy which is not obviously committed to counterpart theory. The general strategy is to relocate structural complexity from the *relata* of grounding – complexity that shows up in the structure of states of affairs – to our interpretations of the linguistic expressions used to refer to them in grounding claims. Counterpart theory provides one way of doing this but perhaps a similar proposal could be developed which does not rely on counterpart theory.

In any case, I will not try to defend counterpart theory here. I note, however, that the proposal relies on the counterpart theoretic *semantics* of token de re modal claims. It does not rest heavily on Lewis's metaphysics of modality and it does not presuppose that a reductive analysis of modality is available.

I will begin (sect. 6.2) with an intuitive and selective statement of David Lewis's counterpart theory of de re modality. I will then explain the proposed account of grounding (sects. 6.3-6.9), explaining how it answers the above challenge. Finally, I consider an objection from Fraser MacBride (sect. 6.10)

6.2 Counterpart theory

Grounding is not a modal relation so we should not expect a purely counterpart-theoretic account of grounding. However, counterpart theory oils the wheels of the theory of grounding by helping dimensioned theorists to specify the relation between grounding and modality and explanation.

We begin with an intuitive and selective statement of David Lewis's counterpart theory of de re modality (Lewis 1968 is the original version of counterpart theory, presented as a theory for translating sentences of quantified modal logic to first-order logic, enriched with special purpose predicates. For details and defence of the revised version that I appeal to here, which focuses on token de re modal claims and emphasizes the role of context in their evaluation, see Lewis 1971; 1986 sect. 4.2; for further discussion see Divers 2002: ch 8; 2007).

Counterpart theory requires an ontology containing non-actual possible worlds and individuals. More carefully, it requires such an ontology if it is to assign the intuitively correct truth values to modal claims and pending some fictionalist interpretation of the theory. According to Lewis (Lewis 1986a: chapter 1, sect. 1.6), possible worlds (both actual and non-actual) are mereological sums meeting the following conditions: possible worlds are *concrete*, in that all of their parts are spatiotemporally located; *maximal*, in that they are closed under spatiotemporal relatedness – anything spatiotemporally related to a part of world W is also a part of W ; and *unified*, in that no parts of a world are spatiotemporally unrelated to each other. Something is a possible individual if and only if it is wholly contained (properly or improperly) by some possible world.

The following biconditionals, connecting modal sentences to sentences quantifying over possible worlds, are familiar:

It is possible that p if and only if there is some world at which p

It is necessary that p if and only if at all worlds p

These biconditionals concern modality de dicto. The following analogues for modality de re suggest themselves:

Possible individual x is possibly F if and only if there is some possible world
at which x if F

Possible individual x is essentially F if and only if x is F in all worlds at which x exists

These are unacceptable on Lewis's theory because, on Lewis's modal metaphysics, no individual is part of more than one possible world. Therefore these biconditionals entail a strong form of essentialism, according to which any possible individual has all its properties essentially. Lewis cannot give a plausible theory of de re modality with these biconditionals.

A crucial notion of counterpart theory is the notion of a counterpart relation. The counterpart relation is a substitute for identity. For Lewis, no possible individual is part of more than one possible world, so individuals in different worlds are never identical. Instead, a possible individual x has counterparts in other worlds. These are x 's proxies in the other worlds. A world represents an actual object x as existing and having various properties by containing a counterpart of x which has those properties. Counterpart relations are relations of similarity: x 's counterparts are all the possible individuals, in any possible world, which are similar to x in some relevant respects (Lewis 1968: 115).¹

More generally, counterpart theory says:

An object x in world w_1 is possibly an F if and only if x has, in some possible world, a counterpart that is F

An object x in world w_1 is essentially an F if and only if all of x 's counterparts, in all possible worlds, are F

Crucially, counterpart theory assigns truth conditions to token de re modal sentences and not to sentence types. Similarity relations, hence counterpart relations, are objective and mind-independent. However the selection of the counterpart relation, relative to which a token utterance of a de re modal claim is evaluated, depends on features of the context in which claim is uttered. For our purposes, context can be understood broadly, so as to include the utterer's spatiotemporal location, intentions, expectations, the background knowledge of the audience, linguistic conventions of the community etc.

Context can make particular respects of similarity salient and thereby select a counterpart relation relative to which a token modal claim is evaluated (or if a unique counterpart relation is not determined, context can select a class of counterpart relations; I take this qualification as read in what follows). For example, in a discussion of Lewis's philosophical accomplishments, similarity with respect to these might become salient, and so the counterpart relation invoked might be one in which all of Lewis's counterparts are philosophers: Lewis is essentially a philosopher, relative to this context. Change the context, and he will have counterparts who are carpenters: Lewis might have been a carpenter. Change it enough and perhaps he has a poached egg as a counterpart.

This is an instance of a general emphasis that Lewis places on the role of context in determining the content of utterances. It is especially notable that he endorses a principle of charity whereby sincere assertions tend to generate contexts in which they are true (Lewis 1979: 340). This applies in the modal case too. For example, my assertion that Lewis is essentially a philosopher itself helps to select a counterpart relation which only includes philosophizing counterparts.

¹By allowing that x 's counterparts can exist in any possible world, I depart from Lewis 1968: 114, postulate 5, according to which nothing is a counterpart of anything else in its world; Divers 2007: 44 persuasively argues against this postulate.

6.3 Qua terms

Counterpart-theoretic essentialism is, as Lewis puts it, a “half-hearted and flexible essentialism” (Lewis 2003: 27). According to counterpart theory, essentialist claims are true relative to counterpart relations and, with respect to most de re modal predications p , there are counterpart relations relative to which p is true and others relative to which it is false. Context determines which counterpart relation is relevant for evaluating a token utterance of p and hence whether the utterance of p is true. According to counterpart theory, there is no context-independent fact of the matter about whether something has its properties essentially or accidentally.

Perhaps some essentialist intuitions are stable across contexts. Kripke (1980: 112–14) has the intuition that Queen Elizabeth could not have had different genetic origins: necessarily, anyone born to different parents is not Queen Elizabeth. His comments suggest that he takes this to be true across contexts, in the sense that there is no possible conversational context in which its negation is true.

This is very far from obviously the case but suppose it is – suppose that this essentialist judgement does not change with changes of conversational context. As John Divers points out, counterpart theory can accommodate – and indeed explain – this constancy (Divers 2007: 46). It is consistent with counterpart theory that some names in English have entrenched counterpart-theoretic connotations so that their use in a modal context forces the selection of a certain sort of counterpart relation. For instance, ‘Queen Elizabeth’ might be such that its use in modal contexts invariably selects a counterpart relation whereby all counterparts of Queen Elizabeth originate in counterparts of the actual sperm and egg that she came from.

The central idea of the things qua grounders approach is to restrict the grounding predicate so that it is only flanked by singular terms that have this feature: singular terms whose use, at least in the context of grounding claims, determines a specific set of counterpart relations, or even a unique counterpart relation, trumping countervailing pressures exerted by context of utterance.

If we only had the referring terms of ordinary English it would be difficult to impose this restriction. A syntactic restriction seems inappropriate given that, in English, the counterpart-theoretic connotations of a term are not revealed syntactically. There is no syntactic feature of singular terms in English which indicates whether and how they select counterpart relations. For example, non-syntactic facts about how the term was introduced into the language can be relevant. In addition to the problem of imposing the restriction, it is extremely unlikely that natural language contains a rich enough stock of context-determining terms, for our purposes. Indeed, it is not obvious that ordinary English contains *any* – Kripke’s intuitions of the essentiality of origin, for instance, are contentious.

Lewis (2003: 30) introduces a class of singular terms whose counterpart-theoretic connotations are encoded and can be ‘read off’ their surface form. These singular terms have the form: ‘ A qua F ’, where ‘ A ’ stands for any singular term and ‘qua F ’ is an adjectival modifier. This modifier is such that when it is applied to a singular term, it adds counterpart-theoretic connotations to that term. For instance, any token occurrence of the term ‘ a qua F ’ in a modal context generates a context in which all counterparts of a are F . Similarly, any occurrence of ‘ b qua G ’ in a modal context generates a context in which all counterparts of b are G . And so on. Given that such terms can be introduced into our language, we do not need stand on whether natural language in fact contains any.

Lewis himself deploys these terms in the context of a modal analysis of truthmaking. References to Lewis’s view about truthmaking in the rest of this section are specifically to his 2003 view; for insightful discussion of Lewis’s changing views about truthmaking,

see MacBride 2005.

Like many truthmaker theorists, Lewis accepts truthmaker necessitarianism, the view that if x makes true $\langle p \rangle$ then it is necessary that if x exists then $\langle p \rangle$ is true (Lewis 2003: 28; for a defence of this principle see Armstrong 1997: 116). Like many truthmaker theorists, Lewis circa 2003 thinks that propositions expressed by inessential predications, propositions like $\langle \text{Rex is barking} \rangle$, have truthmakers. But what are the truthmakers for such propositions? Many truthmaker necessitarians, including Armstrong, think that states of affairs make true inessential predications, like $\langle \text{Rex is barking} \rangle$. The *subjects* of such claims, like Rex, are not normally thought to make these propositions true because they could exist without the predications being true of them (they are inessential predications after all). For instance, Rex himself might have existed without barking so, the thought goes, Rex is not a truthmaker for $\langle \text{Rex is barking} \rangle$. Instead, we need to introduce states of affairs, or perhaps non-transferrable tropes, to make inessential predications true.

Lewis proposes that we understand the claim that x makes true $\langle p \rangle$ as the claim that x is essentially such that $\langle p \rangle$ is true. Given counterpart theory, this is interpreted as the claim that all of x 's counterparts are such that $\langle p \rangle$ is true – at any world w in which a counterpart of x exists, $\langle p \rangle$ is true at w . What entities are essentially such that $\langle \text{Rex is barking} \rangle$ is true? For the counterpart theorist, the answer will depend on the what counterpart relation we are considering the entity under.

For the counterpart theorist, there is no context-independent fact of the matter about whether an entity is essentially such that any given proposition is true. So there is no context-independent fact of the matter about what propositions a given entity makes true. In some contexts of utterance x might be necessarily such that $\langle p \rangle$ is true, in others not. This presumably goes for states of affairs as much as anything else. There is no obvious reason to think that there are no contexts in which it is true to say that [Rex is barking] might exist while $\langle \text{Rex is barking} \rangle$ is false. In a context that emphasizes [Rex is barking]'s status as a state of affairs but not its constituents and manner of composition, it may be that [Tom is reading] is a counterpart of [Rex is barking]. For philosophers used to hearing 'Lewis might have been a poached egg' as expressing a truth, this claim about states of affairs should not seem radical.

Even if, for whatever reason, no such context is possible, the counterpart theorist has no reason to think that this has anything to do with the *metaphysical* nature of states of affairs. It is more plausible that this is another instance of the phenomenon we have already seen – we explain this constancy in terms of the stable counterpart-selecting semantic properties of the expressions we use to denote the entities in question, and not in terms of metaphysical facts about those entities. In this case, the most parsimonious explanation of the constancy, if it is there, is that the expressions we use to refer to states of affairs – expressions like '[a is F]' – have entrenched counterpart-theoretic connotations, so that nothing counts as a counterpart of [a is F] unless it contains a counterpart of a that is F . For counterpart theorists, the metaphysical nature of these entities need play no role in accommodating truthmaker necessitarianism. The claim that states of affairs make inessential predications true is neither necessary nor sufficient for truthmaker necessitarianism, if counterpart theory is correct. It is not necessary because terms for other entities can have fixed counterpart-selecting properties; and it is not sufficient because terms for states of affairs might lack such properties.

In some contexts it is true to say that particular individuals, like Rex, are essentially such that inessential predications about them are true. In a context that emphasises Rex's barking, an utterance of the following sentence type would be true: 'Rex is essentially such that $\langle \text{Rex is barking} \rangle$ is true'. Using the terms that Lewis has introduced, we can force such a context by using the name 'Rex qua barking'. Any utterance of 'Rex

qua barking is essentially such that <Rex is barking> is true' is guaranteed to be true.² This, Lewis thinks, means that we do not need to posit states of affairs as truthmakers for inessential predications. And Lewis and Rosen (2003) extend the account to apply to negative existentials as well.

For counterpart theorists the unit of evaluation for de re modality is sentence token rather than sentence type. Nonetheless there is a sense in which we can evaluate sentence types where the contextually variable parameters that are relevant to their truth or falsity remain fixed, across contexts, along the dimensions relevant for their truth. The truth values of tokens of these sentence types do not vary across contexts. Sentences that use Lewis's qua names are apt to be like this, because the counterpart selecting properties of such names are stable across contexts. For instance, tokens of the sentence type 'Rex qua barking is essentially such that <Rex is barking> is true' are always true, whatever other contextual pressures apply to any given utterance. I will say that a sentence type that has this feature is 'super-true'.

There is a corresponding sense in which sentence types can be referentially opaque. Consider the following two sentence-types:

(1) Rex qua barking makes true <Rex is barking>

(2) Rex qua brown makes true <Rex is barking>

The use of the term 'Rex qua barking' in (1) ensures that (1) is super-true (modulo the complications noted in footnote 2). It does this by ensuring that, in any context of utterance, all counterparts of Rex are barking. But the second is not super-true. Although contextual pressures might, in particular cases, select a counterpart relation relative to which an utterance of it is true, there is no reason to expect this to happen because, relative to some counterpart relations, Rex presumably has brown and non-barking counterparts.

These examples illustrate a sense in which the predicate 'makes true' is, on Lewis's account, referentially opaque in its left argument place. On Lewis's view we can replace the term in the left argument place of a super-true sentence type of the form '*X* makes true <*p*>' with a coreferring term and the resulting sentence type might not be super-true. (We will see in sect. 6.6 that an analogous point holds for my account of grounding).

In what follows I will go beyond Lewis's discussion in various ways. Still, the account I give remains close in spirit to Lewis's.

6.4 Terminology

Let us call the adjectival modifiers that Lewis appeals to *settings*. We should lay aside the meaning that 'qua' has in English. Settings are not part of ordinary English. They are items of theoretical jargon whose role is to add context-selecting connotations to referring terms. More specifically, they are functors that take singular terms as input and give singular terms, with context-selecting connotations added, as output. This exhausts their semantic role. There are no settings that apply to anything other than singular

²Actually things are not so straightforward. For Lewis propositions are sets of possible worlds, which means that most propositions are not wholly part of any possible world. The application of counterpart theory to such entities raises difficult issues. If we understand (Rex) by analogy with 'Humphrey might have beaten Nixon', which is understood as the claim that there is a counterpart of Humphrey that beats a counterpart of Nixon, then we will need to interpret talk of counterparts of propositions. But, as Divers 1999: 234, fn. 16 notes, it is unclear how such talk is to be interpreted. And if we can legitimately talk of counterparts of propositions, Lewis seems to assume that all counterparts of <Rex is barking> are true if Rex is barking. Why is this warranted? It seems to me that Lewis might need to use qua names in both argument places of the predicate 'makes true'.

terms or ordered pluralities of singular terms. I will adopt the convention of writing settings in the following manner: $\dots^{\text{Predicate}}$. For instance, the setting ‘ \dots qua red’ will be written: ‘ \dots^{Red} ’.

To ensure our account is sufficiently general we should introduce as many settings as there are predicates. We can extend the notion of adicity to settings, the adicity of a setting being the number of singular terms that it operates on. This notion of adicity is parasitic on the more usual notion of predicate adicity: a setting’s adicity is just that of the predicate that it corresponds with. This view and the abundance claim imply that any n -place predicate corresponds with an n -place setting and where a predicate has variable adicity then the corresponding setting has variable adicity.

Lewis himself does not discuss polyadic settings and, as Fraser MacBride (2005: 131) says, this is a lacuna in his account of truthmaking. But whether or not Lewis needed to or wanted to appeal to polyadic settings, we certainly need them.

When a setting is applied to an n -tuple of terms, the result is an *assignment* of that setting. An example of an assignment is ‘ a^F ’, i.e. ‘ a qua F ’. When a setting is applied to a tuple of singular terms I will say that the resulting assignment *contains* those singular terms. Where an assignment S contains terms ‘ a_1 ’ \dots ‘ a_n ’ I will say $a_1 \dots a_n$ – the entities themselves – *satisfy* S . The entities that satisfy an assignment are just the entities that the assignment denotes. I will say that assignments are *coextensive* if and only if they are satisfied by exactly the same entities.

In polyadic assignments, counterparts of pluralities are selected based on their joint instantiation of some property. In most cases, this property will be extrinsic relative to each of the entities in the plurality. Consider the assignment ‘Jack, Jill ^{Are married}’. This assignment selects pairs of counterparts of Jack and Jill that are married, which is an extrinsic property of both Jack and Jill and even their fusion (relying, as it does, on wider social conventions). Marriage is a symmetrical relation, but not all relations are. We therefore need to take account of the ordering of the singular terms that an assignment contains.

Polyadic assignments are needed because, as we will see, it is plausible that the grounding relation is variably polyadic on both sides. Since I will be using assignments to denote the relata of grounding, we need to allow assignments that refer to several entities. Polyadic assignments require counterpart relations between ordered pluralities of things. Counterpart theorists need to make allowances for such counterpart relations in any case, to interpret modal claims such as: Castor might have died before his identical twin Pollux (Hazen 1979: 334; Lewis 1986a: 232-3).

According to MacBride, using settings that select counterparts based on extrinsic similarities “stands in prima facie tension with Lewis’ official policy that counterpart relations should rest ‘predominantly’ upon the sharing of intrinsic properties” (MacBride 2005: 131). MacBride’s objection is that, by Lewis’s own lights, extrinsic counterpart relations should be rejected.

MacBride’s statement of Lewis’s ‘official policy’ is misleading. We can see this by quoting the passage MacBride refers to in full:

Satisfactory counterpart relations, on the other hand, rest upon similarities that strike us as having at least some importance; and they rest predominantly upon intrinsic similarity. Not just on intrinsic similarity between the counterparts themselves, although that will often be part of what makes them counterparts. But a satisfactory counterpart relation will often give a lot of weight to intrinsic similarity *between the contexts in which the counterparts are embedded in their worlds* (Lewis 2003: 33, my emphasis).

Even more explicit is Lewis’s earlier claim that “counterparts are united by similarity, but often the relevant similarity is mostly extrinsic” (Lewis 1986: 88). This shows that Lewis

allows that counterpart relations can rest on the sharing of extrinsic properties and I can see no textual evidence for MacBride's assertion to the contrary.

Generally speaking, it is in the spirit of counterpart theory to treat counterpart relations as being at the mercy of conversational context and not of some deep metaphysical distinction, like the intrinsic-extrinsic distinction. We should not expect speakers' conversations to track this distinction so we should not think that counterpart relations only depend on intrinsic similarities.

Moreover, there is special reason for us to insist that counterpart relations are independent of the intrinsic-extrinsic distinction. For we might wish to appeal to grounding in an analysis of the intrinsic-extrinsic distinction (Rosen 2010: 112). Since I will be using assignments to formulate grounding claims, the worry is that we will require a prior grasp of the intrinsic-extrinsic distinction to formulate grounding claims: otherwise, how will we know which assignments are legitimate? The problem then is that grounding would be unfit to feature in a reductive analysis of the intrinsic-extrinsic distinction.

It is important to emphasise that settings do not alter the syntactic category of the terms they operate on. For instance, applying a setting to a singular term does not result in a sentence. If a monadic setting ' \dots^F ' is applied to the singular term ' a ', the resulting assignment ' a^F ' is still a singular term. Likewise, if an n -adic setting ' \dots^{F_n} ' is applied to an ordered plurality of singular terms ' $a_1 \dots a_n$ ', the resulting assignment ' $a_1 \dots a_n^{F_n}$ ' is still an ordered plurality of singular terms.

It is important to emphasise that settings do not alter the denotation of the terms they operate on. For instance, ' a^F ' is a singular term that denotes a ; ' $a_1 \dots a_n^{F_n}$ ' is an ordered sequence of singular terms that denote $a_1 \dots a_n$ in that order. Crucially, ' a^F ' does not denote a complex entity with a as a constituent – the state of affairs of a 's being F , or any such thing. No additional ontological commitments are introduced by using assignments (except to the assignments themselves).

How do settings interact with existing counterpart-theoretic connotations of the terms they contain? The most dramatic cases are assignments that contain assignments – assignments of the form: ' a^{FG} '. I will stipulate that the outermost setting trumps any connotations of the contained terms.

Note that the setting ' \dots^{Exists} ' is the limiting case: it imposes no constraint on the selection of counterpart relations, because all potential counterparts of any individual exist. This fact notoriously gives rise to the puzzle that counterpart theory seems to imply that every individual necessarily exists, because nothing has non-existent counterparts (see Lewis 1986: 10-13). If, in a grounding claim, we use an assignment of the setting ' \dots^{Exists} ' to denote some entity x , then counterparts of x will be selected via conversational cues in the ordinary way; the setting itself plays no role in the selection process.

How are assignments individuated? There are various options. We may say that for ' a^F ' to be identical with ' b^G ', it is required that ' a ' be synonymous with ' b ' and that ' F ' be synonymous with ' G '. Alternatively, we may say it suffices that these expressions are coextensive. The utility of any given account of assignment individuation cannot really be assessed until we see the role that assignments play in our theory. Moreover, the matter is of no clear relevance for the *metaphysics* of grounding, since assignments are not themselves the relata of the grounding relation (the things they denote are). As far as I can see it just requires a decision, and I will adopt the view that assignment ' a^F ' is identical with ' b^G ' if and only if a is identical with b and F -ness is identical with G -ness. That is, I adopt an extensional account of assignment individuation: on the view I adopt it is consistent to say that ' a^F ' is identical with ' b^G ' even though ' a ' is not synonymous with ' b ' and ' F ' is not synonymous with ' G '. If this account of assignment individuation is problematic we can come back to reassess it (in the discussion that follows we will not encounter any problems with this account).

6.5 Explanation and necessity

I will introduce the term ‘ \blacktriangleleft ’ to express grounding. This is a predicate and I stipulate that it only takes assignments in both argument places. If ‘ \blacktriangleleft ’ has singular terms that are not assignments on either side, the result is ill-formed; ‘ $\{Socrates\} \blacktriangleleft Socrates$ ’ is ill formed, for example. Assignments are convenient because they are syntactically distinctive. This means we can restrict the grounding predicate in the desired manner by syntactic stipulation.

What is this predicate’s adicity? Following Morton (1975), and more recently Oliver and Smiley (2004: sect. 1.3), let us distinguish between a predicates *argument places* and its *positions* at each argument place. An example of Morton’s (Morton 1975: 309-10) is the predicate ‘fought with’. Let us suppose that the fought with relation only holds between pairs of groups. So we can say that the Marines fought with the Grenadiers. There are no restrictions on the number of members each group can contain – the Marines might outnumber the Grenadiers three-to-one or perhaps the fight is between two one-man armies.

There is a sense in which ‘fought with’ is dyadic, because (we are supposing) the fought with relation only ever holds between one group and another group. To codify this, we say that ‘fought with’ has two argument *places* – each occupied by a group. But there is a sense in which the adicity of the predicate is variable, because there is no restriction on how many members each group has. To codify this we say that ‘fought with’ has variably many *positions* at each argument place.

‘ \blacktriangleleft ’ is like ‘fought with’. It is dyadic in the sense that it has two argument places. Another way to put this is by saying that it only takes a single assignment on either side. But it is variably polyadic in the sense that the predicate has variably many positions at each argument place – the assignments can contain arbitrarily many terms.

Grounding claims have the form:

$$a_1 \dots a_n^\varphi \blacktriangleleft b_1 \dots b_n^\psi$$

The restriction to assignments enables us to integrate the concept of grounding into the family of modal and explanatory concepts without abandoning the dimensioned theory’s account of the grounding relation. Using the connective ‘because’ to express explanation, we connect grounding to explanation by affirming the truth of all instances of the schema (G-exp):

$$(G\text{-exp}) a_1 \dots a_n^\varphi \blacktriangleleft b_1 \dots b_n^\psi \rightarrow \varphi a_1 \dots a_n \text{ because } \psi b_1 \dots b_n$$

The claim that grounding is non-contingent can be understood as the claim that all instances of the following schema are true:

$$(G\text{-nec}) a_1 \dots a_n^\varphi \blacktriangleleft b_1 \dots b_n^\psi \rightarrow b_1 \dots b_n^\psi \text{ are essentially such that } a_1 \dots a_n^\varphi \text{ exist}$$

Note that the modal principle (G-nec) involves modality *de re* rather than *de dicto*. It bears emphasis that I do not define ‘ \blacktriangleleft ’ in terms of *de re* modality or explanation: grounding is importantly related to these concepts but is not identical with them. This is the most important disanalogy between the thing qua grounders theory and Lewis’s things qua truthmakers theory, for the latter is a modal analysis of truthmaking (Lewis 2003: 28).

Consider Carrie Jenkins comments on (what I am calling) assignments:

Whether or not these qua aspects constitute structure in the world or whether they are merely shadows of our ways of representing it will, I imagine, be a matter for serious debate (Jenkins 2011: 7)

In this debate I side with those who deny that settings denote worldly structure. Using assignments enables us to bring out grounding's explanatory and modal connotations, but this has nothing to do with the entities denoted by the assignments. In particular, it is not due to metaphysical structure in these entities. It is purely down to the way assignments represent them.

By using ' \blacktriangleleft ' we are able to formulate grounding claims in such a way that the close connections between grounding and explanation and metaphysical necessity can be made explicit. This is crucial to some of grounding's explanatory uses (see chapter 3). But we do not have to give up on the claim that the grounding relation obtains between constituents of facts, a claim which is also crucial (see chapter 5). The things qua grounders approach provides a strategy for defending the dimensioned theory against the problems raised in section 5.5 of chapter 5.

6.6 Referential opacity

(G-exp) and (G-nec) ensure that ' \blacktriangleleft ' is referentially opaque on both sides. It is opaque on the right side. Suppose a is F and also G and b is H . Suppose also that

$$(3) b^H \blacktriangleleft a^F$$

If ' \blacktriangleleft ' were referentially transparent in its right argument place, we would be able to substitute ' a^F ' with the coreferential assignment ' a^G ', to obtain,

$$(4) b^H \blacktriangleleft a^G$$

It follows from (4) and (G-exp) that b is H because a is G . In general there is no reason to expect that the truth of an explanation is preserved when we swap the explanans sentence for another true sentence with the same subject. Indeed, it seems plain that it will not. Suppose that the following is true:

$$(5) \{Socrates\}^{Exists} \blacktriangleleft Socrates^{Exists}$$

From (5) it follows that $\{Socrates\}$ exists because Socrates exists. If ' \blacktriangleleft ' were transparent on its right we could substitute ' $Socrates^{Exists}$ ' in this sentence for the coreferential assignment ' $Socrates^{Is\ Snubnosed}$ ', without altering the sentence's truth value:

$$(6) \{Socrates\}^{Exists} \blacktriangleleft Socrates^{Snubnosed}$$

It follows from (6) that $\{Socrates\}$ exists because Socrates is snub-nosed. But there is a failure of explanatory relevance here and the explanation is implausible.

A similar argument is available that appeals to (G-nec) instead of (G-exp). Consider the following claim, where $a_1 \dots a_n$ are Socrates' constituent atoms and Socrates-wise is the complex Socrates-generating property that Socrates' atoms (at a given time) instantiate:

$$(7) Socrates^{Exists} \blacktriangleleft a_1 \dots a_n^{Socrates-wise}$$

If (7) is true then by (G-nec) all counterparts of $a_1 \dots a_n$ that jointly instantiate the property of being arranged Socrates-wise coexist with a counterpart of Socrates, which is plausible. But replace the assignments on the right with the coextensive assignment ' $a_1 \dots a_n^{Exist}$ ', and the result is:

$$(8) Socrates^{Exists} \blacktriangleleft a_1 \dots a_n^{Exist}$$

By (G-nec) it follows that the existence of any counterparts of the plurality of $a_1 \dots a_n$ necessitates the existence of Socrates. But this is very implausible. After all, these atoms might have existed without Socrates existing – there are possible worlds in which no counterpart of Socrates exists but counterparts of $a_1 \dots a_n$ exist (scattered across the galaxy, say).

Similar considerations show that ‘ \blacktriangleleft ’ is opaque in the left argument place. Consider the following sentence, in which ‘ M ’ denotes Socrates’ mass and ‘ M^* ’ denotes the distribution of masses over $a_1 \dots a_n$:

$$(9) \textit{Socrates}^M \blacktriangleleft a_1 \dots a_n^{M^*}$$

This is a regimentation of the plausible claim that Socrates’ mass is grounded by the masses of his constituents. But substitute ‘ $\textit{Socrates}^M$ ’ in the previous sentence with the coreferring term ‘ $\textit{Socrates}^{\textit{Snubnosed}}$ ’ and we get,

$$(10) \textit{Socrates}^{\textit{Snubnosed}} \blacktriangleleft a_1 \dots a_n^{M^*}$$

from which it follows, by (G-exp), that Socrates is snubnosed because his constituent atoms have the masses they do. But, again, this is an implausible explanation – the mass properties of Socrates’ constituents seem to have nothing to do with the fact that he is snubnosed. Nor is it plausible – as (G-nec) would imply – that all counterparts of $a_1 \dots a_n$ that jointly instantiate M^* -ness coexist with a snubnosed counterpart of Socrates. Exact mass-duplicates of these molecules could exist without any counterpart of Socrates existing at all – for instance, if they are scattered.

As Quine (1956) teaches us, objectual quantification into referentially opaque contexts is problematic. Quantified claims about grounding, like the claim that something is grounded or the claim that nothing grounds itself, are problematic for us. In general, drawing conclusions about the properties (if any) denoted by referentially opaque predicates is problematic. Giorgione was so-called because of his size; but it does not seem that Giorgione instantiates the property of *being so-called because of his size*. What does the demonstrative ‘so’ pick out in this expression? Perhaps this predicate expresses some other property in the vicinity – *being called ‘Giorgione’ because of his size* is a plausible candidate (Quine 1963b: 140). But still, the example shows that inferences from predicate to property are not straightforward in opaque contexts.

The important point to keep in mind is that we are not approaching the metaphysics of grounding by reading a theory of the grounding relation off the grounding predicate. On the contrary, our account of the grounding predicate is being driven by our metaphysics – we are ‘working upwards’, from an account of the grounding relation to an account of the grounding predicate. It is simply not part of our project to draw inferences about the grounding relation from claims about the grounding predicate. What guides our account of the grounding relation? The answer, of course, is our account of grounding’s explanatory roles (as outlined in chapter 3). This account enables us to provide a metaphysical account of grounding without help from linguistic considerations.

Another worry we might have is that the opacity of grounding claims commits us to an implausible kind of linguistic idealism about grounding: if speakers refer to a and b in one way, they *bring it about that* a and b stand in the grounding relation; by referring to them in a different way, they bring it about that a and b do not stand in the grounding relation. Quine 1963b discusses the view that *de re* modal properties are inconstant in this way. This worry confuses linguistic and metaphysical issues. On our view, the grounding relations are out there, independently of us. Grounding *claims* are sensitive to our modes of reference but the *relations* they pick out are not. We are not committed to any objectionable metaphysical inconstancy.

You might reasonably object to the complicated semantics associated with this account. I agree that there is something inelegant about the semantic contortions involved

in using assignments. But I reply that the complexity is worth it, because it allows us to give a more satisfactory metaphysics of grounding.

6.7 Regimentation and reflective equilibrium

Having introduced the predicate ‘ \blacktriangleleft ’ how do we arrive at a class of grounding claims, framed in terms of this predicate? We do it by a process of reflective equilibrium that I will illustrate in this section. We begin with modal and explanatory knowledge: a set of explanations and a set of modal claims that are known to us. For us, explanatory and modal claims are epistemically prior to grounding claims, in the sense that our beliefs about grounding are justified in terms of our beliefs about modal and explanatory matters and not conversely.

This is not to concede that explanatory beliefs and modal beliefs are *explanatorily* prior or that they are *metaphysically* prior: a large part of the point of introducing grounding is that instances of the grounding relation explain, and provide a metaphysical basis for, modal and explanatory phenomena. There is nothing objectionable about claiming that one proposition is evidentially prior to, but explanatorily posterior to, another proposition. In the philosophy of science this phenomenon is known as self-evidencing explanation (Hempel 1965: 370-4). In self-evidencing explanations, the explanandum phenomenon is an essential part of our reason for believing that the explanans phenomenon obtains. That grounding is explanatorily prior to explanation and modality and yet also epistemically posterior to them is not in itself objectionable.

We can think of the process of regimentation as a stepwise procedure. The first step is to decide what grounds what – that is, what grounding relations obtain. The result will be a class of claims like the following: X bears the grounding relation to Y . We arrive at these claims by considering what would have to ground what, in order for the relevant explanatory and modal phenomena to be explained in the best way.

We might decide that {Big Ben} is grounded by Big Ben and that Socrates is grounded by his constituent molecules. Dimensioned theorists can take these claims at face value: they accurately represent the metaphysical situation. But they are not framed in terms of ‘ \blacktriangleleft ’. When we state our final theory of grounding – a chapter in the book of the world, to use Sider’s colourful phraseology – we will state the grounding facts using our primitive predicate ‘ \blacktriangleleft ’.

In order to regiment grounding claims, we use our explanatory and modal knowledge. This knowledge exerts pressure on the admissible regimentations via (G-exp) and (G-nec). The regimentation process is a matter of achieving a kind of reflective equilibrium, between our metaphysics of grounding and the explanatory and modal claims we endorse.

Consider a case study involving two entities a and b , where the following is true of them. For simplicity I will ignore the bearing of modal facts on our regimentations:

- (A) a is F
- (B) a is G
- (C) b is H
- (D) b is I
- (E) b is grounded by a
- (F) b is H because a is F

(G) b is I because a is G

(H) There are no other true explanations of b 's properties in terms of a 's properties

We are looking for a regimentation of (E) that (i) has the right linguistic form and (ii) is consistent with explanatory and modal knowledge, given (G-exp) and (G-nec).

Suppose that the only assignments we have to refer to a and b are: ' a^F '; ' a^G '; ' b^H '; ' b^I '. This gives us four candidate regimentations for (E):

(E₁) $b^H \blacktriangleleft a^F$

(E₂) $b^I \blacktriangleleft a^F$

(E₃) $b^H \blacktriangleleft a^G$

(E₄) $b^I \blacktriangleleft a^G$

Given (G-exp) and (F), (G) and (H) we can eliminate (E₂) and (E₃), which leaves us with:

(E₁) $b^H \blacktriangleleft a^F$

(E₄) $b^I \blacktriangleleft a^G$

These grounding claims are acceptable regimentations, in the sense that they represent a grounding relation that exists; they have the right linguistic form; and they connect with the true explanations in the right way. How do (E₁) and (E₄) relate to one another? They are not synonymous. They have different context-selecting connotations and have different modal and explanatory connotations; neither (without special assumptions) follows a priori from the other.

Nonetheless, they report the same grounding relation, albeit under different modes of presentation. Their relation is analogous to the relation between the following two causal claims, where the flood is identical with the event reported by the times and the famine is identical with the event Jones was talking about:

The flood caused the famine

The event reported by the times caused the event Jones was talking about

I take it that these claims report the same fact – the same instance of causation – but under different modes of presentation.

(E₁) and (E₄) report the same fact and have acceptable explanatory implications. For that reason, I do not suppose it matters which we use in our theories. For instance, I endorse the view that some explanations are underpinned by grounding relations. In the above case, the view is that

(b is H because a if F) because $b^H \blacktriangleleft a^F$

Because (E₁) and (E₄) report the same grounding relation, it is also true that

(b is H because a if F) because $b^I \blacktriangleleft a^G$

Perhaps there is a pragmatic failure here – we are not reporting the fact in the most illuminating way given the explanatory context, because we do not report it in a way that makes the connection between explanans and explanandum explicit. It is like the

pragmatic failure in ‘the event reported by the times explains the famine’, which may be true but is nonetheless not the most informative way of describing the situation. The general lesson I take is that where there are several acceptable regimentations of a single grounding claim, our choice of which to use in any given context is a pragmatic one.

6.8 Property grounding

We saw in chapter 5 (sects. 5.3 and 5.4) that there is reason to think that, in some instances, properties stand in the grounding relation. Call any case in which a property is grounded by another property a case of ‘property grounding’. How are such cases to be expressed? I can see no reason that we need to introduce a different fundamental concept of grounding for such cases, so we should look to regiment them in terms of ‘ \blacktriangleleft ’.

Suppose a ball is scarlet and that,

- (11) The ball is red because it is scarlet

Suppose that redness stands in the grounding relation to scarletness. In order to regiment this we need suitable assignments that refer to these properties. One candidate is the following:

- (12) $Redness^{Instantiated\ by\ ball} \blacktriangleleft Scarletness^{Instantiated\ by\ ball}$

In this claim, reference to ball is relegated to the setting and it plays a merely context selecting role. By application of (G-exp) we obtain the following explanation:

- (13) Redness is instantiated by ball because scarletness is instantiated by ball

One might worry that (13) is a different explanation to (11) and so the proposed regimentation does not give the right results – it does not entail the correct explanations. But this worry does not seem serious: (13) seems to be just a notational variant on (11) and I see no reason to think that it differs in any significant respect – in epistemic value, for instance – from (11).

In chapter 5 (sect. 5.4) we isolated a class of grounding claims that we called mixed cases. Plausible cases are the following:

- (14) The fact that a sample of gas S has temperature T at t is grounded by the fact that S ’s constituent molecules $m_1 \dots m_n$ have X at t (X the distribution of kinetic energy properties over $m_1 \dots m_n$)
- (15) The fact that diamond D is hard is grounded by the fact that D ’s constituent atoms $a_1 \dots a_n$ are arranged Y -wise
- (16) The fact that Jones is happy is grounded by the fact that his neurons $n_1 \dots n_n$ are firing Z -wise

We argued that these cases are distinctive because each involves a pair of grounding relations – one between the distinct *properties* and another between the distinct *individuals* that instantiate these properties; loosely speaking, there is grounding at both subject and predicate position in (14), (15) and (16).

If mixed cases involve two grounding relations, we should not expect them to have just one regimentation – rather, we should expect them to have two different regimentations. For instance, (14) bifurcates into the following two grounding claims:

- (14+) $SHas\ temperature\ T \blacktriangleleft m_1 \dots m_n^X$

- (14++) $T\text{-ness}^{Is\ instantiated\ by\ S} \blacktriangleleft X\text{-ness}^{Is\ instantiated\ by\ m_1 \dots m_n}$

(14+) says that the *sample* is grounded by the *molecules*, with the properties playing the role of context selection; (14++), by contrast, says that the *property* of being *T* is grounded by that of being *Z*, with entities *S* and $m_1 \dots m_n$ playing a context-selecting role.

A good feature of the present view is that it allows us to bring out the distinctive difference between mixed cases and other cases; the fact theory tends to obliterate these differences by only allowing grounding relations to obtain between whole facts.

6.9 Variably polyadic on both sides

We should take the grounding relation to be variably polyadic on both sides. We want to be able to say that a single thing can be grounded by multiple things taken together – that Socrates is grounded by his constituents, for instance. But I also think that we should take grounding to be plural on the left as well (see Dasgupta manuscript). There is special pressure on us to allow grounding to be plural on the left, given that we are avoiding facts in our regimentations. There are, plausibly, irreducibly plural truths (Oliver and Smiley 2001) and some of these concern non-fundamental things. Suppose that Arthur, Gawain and Lancelot are surrounding a castle. Their surrounding the castle is, perhaps, grounded by a complex fact about fundamental particles.

We want to be able to say that the fact that Arthur, Gawain and Lancelot are surrounding the castle is grounded by this complex fact, and the natural way to regiment this is with a claim of the form:

Arthur, Gawain, Lancelot Surrounding the castle $\blacktriangleleft a_1 \dots a_n^\varphi$

With exotic enough settings we could come up with regimentations that only involve monadic assignments. Instead of using the assignment ‘ a, b^φ ’ we might use a^φ *related to b*. In this assignment reference to *b* is relegated to a context-selecting role (see also MacBride 2005: 131). But this seems unprincipled. We allow entities ‘acting jointly’ to ground so why would we not allow some entities to be jointly grounded? I do not see any good reason to treat left and right argument place differently.

6.10 A cheat?

Fraser MacBride raises the following objection to the use of assignments in explanatory contexts. His target is Lewis’s account of truthmaking but the objection applies to the present proposal too:

Ask yourself the question: in what circumstances does an ordinary thing merit the name ‘*a qua F*’? Well just when *a* exists and *a* is *F*. This leaves it open that *a qua F* is nothing more than a projection from the truth of the proposition that *a* is *F*, the phrase ‘*a qua F* exists’ serving as nothing more than a cumbersome, and potentially misleading, substantival device for reaffirming the truth of the proposition that *a* is *F*. But if *a qua F* is nothing more than a projection then we can hardly say the proposition that *a* is *F* is true because *a qua F* exists. The relation reported by ‘because’ requires distinct relata. So *a qua F* cannot be explanatorily responsible in any non-trivial sense for the truth that *a* is *F*. If it is no more than a projection *a qua F* lacks the explanatory potential required of anything properly deserving the title ‘truthmaker’ (MacBride 2005: 132).

MacBride’s objection, I take it, is that ‘*a qua F* exists’ is just a notational variant of ‘ $\langle a \text{ is } F \rangle$ is true’. So to say that *a qua F* exists is a (somewhat misleading) way of

saying that $\langle a \text{ is } F \rangle$ is true. Therefore the explanation ‘ $\langle a \text{ is } F \rangle$ is true because a qua F exists’ is false, because it is synonymous with the false sentence, ‘ $\langle a \text{ is } F \rangle$ is true because $\langle a \text{ is } F \rangle$ is true’.

What does MacBride think the phrase ‘ a qua F ’ means? His claim that ‘ a qua F exists’ is synonymous with (or a misleading reformulation of) ‘ $\langle a \text{ is } F \rangle$ is true’ suggests that ‘ a qua F ’ names a proposition. Alternatively, it might be claimed that ‘ a qua F ’ is a disguised sentence, which can be unpacked as ‘ a is F ’. Either way, it would be bad news for us. We need qua names to be referring terms, so if it turns out that they are disguised sentences then they cannot play the role we have given them. And we need them (in many cases) to denote individuals and properties – not (or not only) propositions.

MacBride’s objection is puzzling because we do *not* leave it open that ‘ a qua F exists’ is nothing more than a substantival device for reaffirming the truth of the proposition that a is F . We have stipulated that ‘ a qua F ’ is a name for a – how can we be wrong about this? It is true that a merits the name ‘ a qua F ’ only if a is in fact F . But the explanation for this is that the name is stipulated to select only counterparts of a that are F and it cannot do this if a is not F , because the counterpart relation is reflexive (Lewis 1968: 114, postulate 6).

Perhaps MacBride is arguing that our stipulation fails – we try to introduce a class of singular terms with strange context-selecting properties, but we fail to do so. After all, we cannot stipulate just anything. I cannot, for instance, succeed in introducing an expression with the stipulation that it is both true and false. But the question is whether there is any reason to think that our stipulation fails in this case and MacBride does not provide any.

MacBride’s talk of projection suggests an epistemological worry, according to which our understanding of qua names is parasitic on our understanding of sentences affirming the truth of propositions. The worry is that the only understanding we have of ‘ a qua F ’ is as synonymous with the phrase: ‘that the proposition that a is F is true’. But this is unpersuasive. We can explain the meaning of ‘ a qua F ’ in terms of semantic concepts like that of denotation and concepts from counterpart theory. There is no reason to think that our understanding is parasitic on our understanding of some corresponding sentences.

6.11 Summary and conclusion

Appealing to assignments allows us to provide connecting principles between grounding and explanation and necessity without commitment to the claim that grounding relates states of affairs. In this way a coarse-grained structure of properties and particulars can underpin a rich domain of explanations. Whereas Audi postulated an intermediate metaphysical level, between this coarse-grained structure and explanations, we connect the two by adding a layer of semantic complexity to grounding claims. I think that this provides a more elegant and parsimonious metaphysics for explanation. There are costs associated with our approach: our predicate does not represent the grounding relation perspicuously and, as we will see in the next chapter, it makes discussing the logic of grounding awkward. And it involves commitment to counterpart theory. Nonetheless, I think the attraction of having a better metaphysics of grounding is significant and, perhaps, outweighs these costs.

Chapter 7

Structural principles

7.1 Introduction

In this chapter I will assume the account of grounding proposed in the previous chapter and, against that backdrop, discuss the following three questions in the logic of grounding:

- (1) Is grounding transitive?
- (2) Is grounding irreflexive?
- (3) Is grounding asymmetric?

Our framework raises special issues with respect to these questions. In particular, as we will see in section 7.2, these questions are importantly ambiguous for us. They can be understood as concerning either the logical properties of the grounding *relation* or as concerning the logical properties of the *predicate* that denotes this relation, which in our case is ‘ \blacktriangleleft ’. This ambiguity is not unique to our framework – anyone who distinguishes between the grounding relation and the predicate that denotes it should distinguish between an account of the logical properties of the former and an account of the logical properties of the latter. But the ambiguity has a special significance for us.

We could afford to be careless about distinguishing our account of the logical properties of the grounding relation from our account of the logical properties of the grounding predicate if these accounts did not diverge – if the logical properties of the grounding relation were mirrored by the logical properties of the grounding predicate, so that the grounding relation is irreflexive (or transitive or asymmetric) if and only if the grounding predicate is irreflexive (or transitive or asymmetric). But it will transpire that our account of the grounding relation differs dramatically from our account of ‘ \blacktriangleleft ’; so *we* cannot afford to be careless about the distinction.

This will become clear as we progress. In section 7.2 I will illustrate how we should understand questions (1)-(3) so that they apply to the predicate ‘ \blacktriangleleft ’; and I will also show that there is no reason to expect that our account of the logical properties of this predicate will mirror our account of the logical properties of the grounding relation. Then in section 7.3 I will show how we can describe the grounding relation in terms of ‘ \blacktriangleleft ’. In section 7.4 I distinguish full grounding from a concept of partial grounding. This allows us to distinguish a strong and weak irreflexivity claim, which warrant separate discussion.

With these preliminary matters addressed, we will go on to discuss questions (1)-(3). Question (1) is addressed in section 7.5, question (2) is addressed in section 7.6 and question (3) is addressed in section 7.7. We will see in these sections that the properties of the grounding relation plausibly differ significantly from the properties of ‘ \blacktriangleleft ’.

Many grounding theorists take grounding to be transitive, irreflexive and asymmetric – indeed, this conjunction of views is standard among grounding theorists (Correia 2010: sect. 4; Rosen 2010: 115-7; Schaffer 2009: 364). I will provide some speculative reasons for answering each of (1), (2) and (3) in the negative, on at least some candidate interpretations of these questions. Some of this discussion relies on the treatment proposed in chapter 5, section 5.4 of (what we called there) *mixed cases* of grounding, which I recapitulate in section 7.5.3.

7.2 Describing the grounding predicate

In logic and mathematics, transitivity, irreflexivity and asymmetry are often taken to be properties of binary relations. These properties are understood as follows, where the variable ‘ R ’ ranges over binary relations:¹

$$\forall R (R \text{ is transitive}_R \leftrightarrow_{def} \forall xx \forall yy \forall zz (xx \text{ bear } R \text{ to } yy \ \& \ yy \text{ bear } R \text{ to } zz) \rightarrow xx \text{ bear } R \text{ to } zz)$$

$$\forall R (R \text{ irreflexive}_R \leftrightarrow_{def} \sim \exists xx (xx \text{ bear } R \text{ to } xx))$$

$$\forall R (R \text{ asymmetrical}_R \leftrightarrow_{def} \sim \exists xx \exists yy (xx \text{ bear } R \text{ to } yy \ \& \ yy \text{ bear } R \text{ to } xx))^2$$

The subscripted ‘ R ’ indicates that these concepts apply to relations but I will generally omit the subscripts if there is no risk of confusion.

There are also concepts of irreflexivity, transitivity and asymmetry that apply to *predicates*. One can extend the concepts just introduced to predicates by saying that a predicate is transitive if and only if it denotes a transitive relation; that a predicate is irreflexive if and only if it denotes an irreflexive relation; and that a predicate is asymmetric if and only if it denotes an asymmetric relation (Schnieder 2010: sect. 1b). But this will not do for us. We will see in a moment that it is a substantive and difficult question whether the logical properties of the grounding relation coincide with those of the predicate ‘ \blacktriangleleft ’. The definitions of predicate transitivity, irreflexivity and asymmetry just presented would not allow our account of the grounding relation to deviate from our account of the grounding predicate.

We need to describe the logical properties of ‘ \blacktriangleleft ’ without tying our account of this predicate to our account of the grounding relation. We can do this using substitutional quantification. I assume here that substitutional quantification is legitimate, although this is controversial (see van Inwagen 1981), and I will use ‘ Π ’ as the universal substitutional quantifier and ‘ Σ ’ as the existential substitutional quantifier. These quantifiers are interpreted as follows:

$$\Sigma xx (Fxx) \text{ if and only if some substitution instance of 'Fxx' is true}$$

$$\Pi xx (Fxx) \text{ if and only if all substitution instances of 'Fxx' are true}$$

¹Recall that we are using a plural language. Relations are binary in these formulae in the sense that they have two argument places but I leave it open they may have arbitrary many position at either place. For the distinction between places and positions, see chapter 6: sect. 6.5 and the references provided there.

²If there is no binary relation of grounding at all, then a fortiori there is none that has these features. The claim that there is a non-binary relation of grounding is considered in Jenkins 2011 and defended in Schaffer forthcoming. The claim that there is no relation of grounding at all is defended by connective theorists, including Correia (2010) and Fine (forthcoming a). Note that there are alternative concepts of transitivity, irreflexivity and asymmetry that apply to binary sentential connectives, so there are non-trivial questions about the transitivity, irreflexivity and asymmetry of binary connectives used to express grounding. See Schnieder 2010: sect. 1b. I assume in this chapter that the connective theory is wrong, so I will not consider these alternative interpretations for (1)-(3).

where a substitution instance of ‘ Fxx ’ is the result of replacing ‘ xx ’ in this schema with a plurality of individual constants (possibly consisting of just one) in the language for which the quantifiers are defined. Since I will only use substitutional quantifiers to bind variables in ‘ \blacktriangleleft ’ contexts, we can add the side condition that ‘ xx ’ be replaced by an assignment, rather than an other kind of individual constant or plurality of them, in substitution instances of ‘ Fxx ’. The loss of generality that is incurred will not matter for us, given that ‘ \blacktriangleleft ’ is only satisfied by assignments, and this side condition might help to focus the discussion.

It will be helpful, in what follows, to use Quine’s concept of quasi quotation, for which I will use the corner brackets ‘ \ulcorner ’ and ‘ \urcorner ’ (Quine 1940: 36). Ordinary quotation is used to refer to the particular linguistic expressions that are inside quote marks: for instance, ‘ a ’ denotes a specific letter, the first letter of the English alphabet. Quasi quotation is used to denote non-specified expressions. If we interpret ‘ a ’ as a metalinguistic variable – a variable which ranges over linguistic expressions – then ‘ $\ulcorner a \urcorner$ ’ denotes the *value* of this variable, and not the first letter of the English alphabet, unless this letter happens to be the value of this variable.

We can introduce the following concepts of transitivity, irreflexivity and asymmetry that apply to the dyadic predicates, as follows:

$$\forall R(\ulcorner R \urcorner \text{ is transitive}_P \leftrightarrow_{def} \Pi x \Pi y \Pi z ((Rxyy \wedge Ryyz) \rightarrow Rxxz))$$

$$\forall R(\ulcorner R \urcorner \text{ is irreflexive}_P \leftrightarrow_{def} \sim \Sigma x (Rxxx))$$

$$\forall R(\ulcorner R \urcorner \text{ is asymmetric}_P \leftrightarrow_{def} \sim \Sigma x \Sigma y (Rxyy \wedge Ryyx))$$

The subscript ‘P’ stands for ‘predicate’ and is used to distinguish these concepts from their relational analogues. Again, I will generally omit these subscripts where no there is no risk of confusion.

Distinguishing these concepts makes (1), (2) and (3) ambiguous. For we may understand them as asking whether the grounding relation is transitive_R, irreflexive_R or asymmetric_R; or as asking whether ‘ \blacktriangleleft ’ is transitive_P, irreflexive_P or asymmetric_P. It is important to separate these readings of (1), (2) and (3) because, as I will now show, there is no reason to expect the logical properties of ‘ \blacktriangleleft ’ to coincide with the logical properties of the grounding relation.

Suppose that the predicate ‘ \blacktriangleleft ’ is irreflexive_P: $\sim \Sigma x (xx \blacktriangleleft xx)$. This tells us something about the kind of linguistic structure true grounding claims have. In particular, it tells us that there are no true grounding claims in which a single assignment stands on both sides of ‘ \blacktriangleleft ’. But it does not, without substantive additional premises, imply that the relation that denoted by ‘ \blacktriangleleft ’ is irreflexive (Jenkins 2011). This is because the fact that no assignment stands on both sides of a true grounding claim might be explained by nature of the counterpart relations that each assignment selects and not by irreflexivity of the underlying grounding relation.

To make the point slightly differently, it may be that there are no true grounding claims in which one and the same assignment flanks ‘ \blacktriangleleft ’. But it does not follow that there are no true grounding claims that have coextensive assignments flanking this predicate, because there are distinct yet coextensive assignments. Consider, for instance, claims of the form:

$$a^F \blacktriangleleft a^G$$

A claim of this form has distinct assignments flanking ‘ \blacktriangleleft ’ as long as ‘ F ’ and ‘ G ’ stand for different properties (this assumes the account of assignment individuation given in chapter 6: sect. 6.4). Any claim of this form implies that something stands in the

grounding relation to itself, because the terms replacing ‘ a^F ’ and ‘ a^G ’ are coreferential (both denote a). Claims of this form are not ruled out by the claim that $\sim \Sigma xx (xx \blacktriangleleft xx)$. So the irreflexivity_P of ‘ \blacktriangleleft ’ would not imply the irreflexivity_R of the grounding relation. The wider moral is that a set of principles governing the behaviour of ‘ \blacktriangleleft ’ does not constitute an account of the properties of the grounding relation. But we do, naturally, want an account of the grounding relation. We proceed by explaining how we can provide an account of the grounding relation in terms of ‘ \blacktriangleleft ’.

7.3 Describing the grounding relation

In this section I illustrate how we can discuss the properties of the grounding relation. We saw at the beginning of the previous section that the concepts of irreflexivity_R, asymmetry_R, and transitivity_R can be used to discuss the logical properties of relations. And it is perfectly legitimate to use these concepts to describe the grounding relation: we can say that the grounding relation is irreflexive by saying that nothing bears the grounding relation to itself, for instance. This requires a second order language in which terms for properties are admitted, but that is not obviously objectionable.

It would be better to state the formal properties of the grounding relation directly in terms of ‘ \blacktriangleleft ’. Stating both our account of the predicate and our account of the relation in terms of ‘ \blacktriangleleft ’ will help us to see the logical relations between these two accounts. If the two accounts are not stated using the same vocabulary, it is likely to be unclear exactly how the one bears on the other.

But stating the formal properties of the grounding relation using ‘ \blacktriangleleft ’ is rather awkward because objectual quantification into ‘ \blacktriangleleft ’ contexts is problematic. For instance, the following attempt to articulate the claim that the grounding relation is irreflexive is unsuccessful:

$$\sim \exists xx (xx \blacktriangleleft xx)$$

Given our account of ‘ \blacktriangleleft ’, this is not well-formed and nor is its negation. If there is a genuine debate to be had about the irreflexivity of the grounding relation, it cannot be construed as a debate about the truth or falsity of this sentence. Similarly, we cannot sensibly construe the debate about the transitivity and asymmetry of grounding as concerning the truth or falsity of the following ill-formed sentences:

$$\forall xx \forall yy \forall zz ((xx \blacktriangleleft yy \wedge yy \blacktriangleleft zz) \rightarrow xx \blacktriangleleft zz)$$

$$\sim \exists xx \exists yy (xx \blacktriangleleft yy \wedge yy \blacktriangleleft xx)$$

So how can we describe the properties of the grounding relation, in terms of ‘ \blacktriangleleft ’?

Recall our methodology for regimenting grounding claims. We first decide what entities stand in the grounding relation and then we decide which assignments to use to refer to these entities in our grounding claims. This decision is based upon our explanatory and modal knowledge, which constrains our assignment choice via (G-exp) and (G-nec). On the assumption that there is a large enough stock of assignments, so that for every instance of the grounding relation there is a corresponding true grounding claim, it is clear that one plurality of entities xx stands in the grounding relation to another plurality yy if and only if there is some true grounding claim in which xx and only xx are denoted by the assignment on the left and yy and only yy are denoted by the assignment on the right.

We can sharpen this up a little as follows. In the previous chapter (sect. 6.4) we said that an assignment is *satisfied by* the entities it denotes. Say that some things xx *exhaust* an assignment a if and only if xx satisfies a and nothing else does. Using ‘ T ’ to express

exhaustion and ‘ S ’ to express satisfaction and ‘ $<$ ’ to express the among relation and ‘ a ’ as a metalinguistic variable ranging over assignments:

$$\forall a \forall xx (Taux \leftrightarrow_{def} Saux \wedge \forall zz (Sazz \rightarrow zz < xx))$$

We can ‘abstract’ the relata of the grounding relation from the assignments used in true grounding claims by introducing the predicate ‘ \triangleleft ’, as follows:

$$\forall xx \forall yy (xx \triangleleft yy \leftrightarrow_{def} \Sigma ss \Sigma rr (ss \blacktriangleleft rr \wedge T^{\ulcorner} ss \urcorner xx \wedge T^{\ulcorner} rr \urcorner yy))$$

I will say that ‘ \triangleleft ’ expresses the concept of ‘transparent grounding’. To say that the xx are transparently grounded by yy is to say that there is some assignment $\ulcorner ss \urcorner$ that is satisfied by xx and nothing else and an assignment $\ulcorner rr \urcorner$ that is satisfied by yy and nothing else, such that $ss \blacktriangleleft rr$.

‘ \triangleleft ’ is a deregulated cousin of ‘ \blacktriangleleft ’ in the sense that it is not restricted to being flanked by assignments. The explanatory and modal connotations of grounding claims are lost if we frame them using ‘ \triangleleft ’. ‘ \triangleleft ’ is referentially transparent in both argument places as long as the predicate ‘ S ’ is referentially transparent in both argument places – that is, as long as the following holds: If $S^{\ulcorner} xx \urcorner yy$ and $\ulcorner xx \urcorner = \ulcorner tt \urcorner$ and $yy = zz$ then $S^{\ulcorner} tt \urcorner zz$. I will take satisfaction to be like this; there seems to be no reason to deny it – satisfaction is the converse of denotation (as the notion applies to assignments) and there does not seem to be any reason to think that ‘denotes’ generates opaque contexts.

Given the concept of transparent grounding, we can understand the claims that grounding relation is transitive, irreflexive and asymmetric, as follows:

$$\text{The grounding relation is transitive}_R \leftrightarrow \forall xx \forall yy \forall zz (xx \triangleleft yy \wedge yy \triangleleft zz) \rightarrow xx \triangleleft zz$$

$$\text{The grounding relation is irreflexive}_R \leftrightarrow \sim \exists xx (xx \triangleleft xx)$$

$$\text{The grounding relation is asymmetric}_R \leftrightarrow \sim \exists xx \exists yy (xx \triangleleft yy \wedge yy \triangleleft xx)$$

These claims contrast with the following, which concern the grounding predicate:

$$\text{‘}\triangleleft\text{’ is transitive}_p \leftrightarrow \Pi xx \Pi yy \Pi zz ((xx \blacktriangleleft yy \wedge yy \blacktriangleleft zz) \rightarrow xx \blacktriangleleft zz)$$

$$\text{‘}\triangleleft\text{’ is irreflexive}_p \leftrightarrow \sim \Sigma xx (xx \blacktriangleleft xx)$$

$$\text{‘}\triangleleft\text{’ is asymmetric}_p \leftrightarrow \sim \Sigma xx \Sigma yy (xx \blacktriangleleft yy \wedge yy \blacktriangleleft xx)$$

We will discuss all of these claims in what follows. Some of the discussion will involve a concept of partial grounding that I will now explain.

7.4 Partial grounding

With the concept of transparent grounding in hand we can define a concept of partial grounding. Many grounding theorists distinguish between full and partial grounding (for notions of partial grounding see Fine forthcoming a: sect. 5; Rosen 2010: 115). The intuitive contrast can be communicated with examples.

{Socrates, Plato} is fully grounded by Socrates and Plato taken together; it is partially grounded by Socrates and partially grounded by Plato.

Big Ben is fully grounded by its two halves, A and B; it is partially grounded by A and partially grounded by B.

In these examples, several entities taken together are said to be a thing's full ground. Any entities that are among a thing's full ground partially ground that thing.

The intuitive concept at work in the above examples is captured as follows (using ' \trianglelefteq ' in formulae to express this notion and in English I will use 'partial grounding'):

$$\forall xx \forall yy (xx \trianglelefteq yy =_{def} \exists zz (xx \triangleleft zz \wedge yy < zz))$$

Intuitively, to say that some entities xx are partially grounded by some entities yy in this sense is to say that there are some entities zz such that $xx \triangleleft zz$ and yy are among zz . Note that xx might be partially grounded, in this sense, by yy and also be fully grounded by yy . This is because it is consistent with yy satisfying an assignment that there is nothing else that satisfies it. This notion of partial grounding does not rule out full grounding. We could easily define a notion of partial grounding that does rule out full grounding, by adding an existential clause to the definiens, to the effect that there are some other entities rr that are among zz but not among yy .

7.5 Transitivity

Many philosophers claim that grounding is transitive (Correia 2010: sect. 4; Fine 2010: 100; Rosen 2010: 116; Schaffer 2009: 376; Whitcomb 2011: sect. 2). We need to discuss the following two transitivity claims:

$$\text{(Trans-P)} \quad \Pi xx \Pi yy \Pi zz ((xx \triangleleft yy \wedge yy \triangleleft zz) \rightarrow xx \triangleleft zz)$$

$$\text{(Trans-R)} \quad \forall xx \forall yy \forall zz ((xx \triangleleft yy \wedge yy \triangleleft zz) \rightarrow xx \triangleleft zz)$$

It is clear, from the discussion of sects. 7.2 and 7.3, that (Trans-P) is the claim that the predicate ' \triangleleft ' is transitive while (Trans-R) is the claim that the grounding relation is transitive.

These claims are logically independent of one another in the sense that there does not seem to be any contradiction or irrationality involved in believing either one of (Trans-P) or (Trans-R) while denying the other.

We can support this claim by considering, schematically, situations that are counterexamples to (Trans-P) but not (Trans-R), and vice versa. I am not arguing, at this stage, that these counterexamples are in fact possible. I am only arguing that it does not seem irrational to believe that (Trans-P) has counterexamples and (Trans-R) has none, or vice versa.

A counterexample to (Trans-P) witnesses (C1):

$$\text{(C1)} \quad \Sigma xx \Sigma yy \Sigma zz (xx \triangleleft yy \wedge yy \triangleleft zz \wedge \sim xx \triangleleft zz)$$

A counterexample to (Trans-R) witnesses (C2):

$$\text{(C2)} \quad \exists xx \exists yy \exists zz (xx \triangleleft yy \wedge yy \triangleleft zz \wedge \sim xx \triangleleft zz)$$

First, we can rationally believe that (C1) is witnessed and (C2) is not. To see this, suppose that there are some entities xx that exhaust two assignments ' $\ulcorner A \urcorner$ ' and ' $\ulcorner D \urcorner$ '. Suppose also that there are two further assignments ' $\ulcorner B \urcorner$ ' and ' $\ulcorner C \urcorner$ ', and two further pluralities yy and zz , such that ' $\ulcorner B \urcorner$ ' is exhausted by yy and ' $\ulcorner C \urcorner$ ' is exhausted by zz . Finally, suppose that $A \triangleleft B \wedge B \triangleleft C \wedge \sim A \triangleleft C$.

The situation just described is a counterexample to (Trans-P) – ' $\ulcorner A \urcorner$ ', ' $\ulcorner B \urcorner$ ', and ' $\ulcorner C \urcorner$ ' jointly witness (C1). Does it also witness (C2)? We do not know yet. It will not witness C2 – and so will not be a counterexample to (Trans-R) – as long as $D \triangleleft C$. This is because ' $\ulcorner D \urcorner$ ' and ' $\ulcorner A \urcorner$ ' are both exhausted by xx , so if $D \triangleleft C$, the situation is one

in which $xx \triangleleft yy \wedge yy \triangleleft zz \wedge xx \triangleleft zz$. It is not absurd to think that this kind of counterexample to (Trans-P) obtains while denying that (Trans-R) has counterexamples, so there is no obvious reason to think that (Trans-R) implies (Trans-P).

Nor is it irrational to endorse (Trans-P) while denying (Trans-R). It is not obvious that a counterexample to (Trans-R) – i.e. a scenario that witnesses (C2) – will inevitably also be a counterexample to (Trans-P). To see this, suppose there are some entities xx that exhaust an assignment $\ulcorner A \urcorner$ and some entities yy that exhaust two distinct assignments $\ulcorner B \urcorner$ and $\ulcorner D \urcorner$ and some entities zz that exhaust an assignment $\ulcorner C \urcorner$. Suppose also that $A \blacktriangleleft B$ and $D \blacktriangleleft C$ but $\sim B \blacktriangleleft C$ and $\sim A \blacktriangleleft C$. This situation witnesses (C2), because $xx \triangleleft yy$ (since $A \blacktriangleleft B$) and $yy \triangleleft zz$ (since $D \blacktriangleleft C$) but $\sim xx \triangleleft zz$ (since $\sim A \blacktriangleleft C$). But this scenario does not witness (C1), because $\sim (A \blacktriangleleft B \wedge B \blacktriangleleft C)$ and, a fortiori, it is not the case that $A \blacktriangleleft B \wedge B \blacktriangleleft C \wedge \sim A \blacktriangleleft C$.

7.5.1 Predicate transitivity

The moral: There is no obvious reason to think that (Trans-P) implies (Trans-R), or vice versa. These transitivity claims seem logically distinct. Is there any reason to believe either claim? Let us begin with (Trans-P). Believing (Trans-P) is of a piece with believing that metaphysical explanation is transitive, in the sense that all instances of the following schema are true, in which the subscripted ‘M’ indicates that metaphysical explanation is at issue:

$$(\text{Trans-exp}): (p \text{ because}_M q \wedge q \text{ because}_M r) \rightarrow p \text{ because}_M r$$

We should be careful to bear in mind that metaphysical explanation is a kind of objective explanation (see ch. 1: sect. 1.3.1). We do not refute (Trans-exp) by arguing that there are some claims $\ulcorner p \urcorner$, $\ulcorner q \urcorner$ and $\ulcorner r \urcorner$ that satisfy the antecedent of (Trans-exp) but where the claim p because r is not an *informative* or *useful* explanation why p (in some context). This is no doubt true; it is presumably no more appropriate, in most contexts, to explain macroscopic phenomena in terms of their microscopic grounds than it would be to cite the Big Bang in explaining the broken refrigerator. But whether some claim objectively explains another is not determined by pragmatic considerations of informativeness or usefulness.

Even with this proviso made, (Trans-exp) is controversial. Jonathan Schaffer (forthcoming: sect. 4.2) describes cases that cast doubt on the idea that metaphysical explanation is transitive. I will only consider one of these examples here.^{3,4}

Consider a ball that is spherical except for a small dent on its surface. The following three claims about the ball are allegedly plausible:

- (a) The ball is nearly spherical because it has the determinate shape that the ball has – call this shape ‘S’.
- (b) The ball has shape S because it is dented.
- (c) It is not the case that the ball is nearly spherical because it is dented.

The support for (c) is that it is not plausible that the ball is nearly spherical because it is dented – intuitively, the dent *detracts from* the ball’s near sphericity instead of

³Similar cases have been discussed in the debate about causation. See, e.g., McDermott 1995: 531-3.

⁴Strictly, Schaffer’s target with these counterexamples is the claim that a notion of full-or-partial grounding is transitive. It is not immediately obvious how this concept is related to the concept of metaphysical explanation, so perhaps Schaffer would not take these to cast doubt on the claim that metaphysical explanation is transitive. Nonetheless, it is natural to adapt these counterexamples to this purpose.

explaining it. In conjunction with (a) and (b), this is supposed to cast doubt on the idea that metaphysical explanation is transitive.

Note that (c)'s plausibility seems sensitive to emphasis. (c) seems implausible if we emphasise 'nearly'. It seems plausible that the ball is *nearly* spherical because of the dent – the dent is what prevents it from being fully spherical. Emphasising 'nearly' draws a contrast with perfectly spherical balls.⁵ (c) is more plausible if we emphasise 'spherical'. The claim that the ball is nearly *spherical* because it is dented would seem to imply that the dent contributes to the sphericity of the ball, and this seems wrong. Let us suppose that emphasis is added in the right places.

The following principle is closely analogous to a principle discussed by Wesley Salmon (1998: 326-9):⁶

If the fact that some thing x is F metaphysically explains why some thing y is G , then the fact that some thing z is F does not metaphysically explain the fact that something r is H , where being H is incompatible with being G .

This principle casts doubt on (b). Suppose that the same dent, or a qualitatively identical one, affects an almost perfect cube. Presumably whatever reason we have for thinking that the ball's shape is partly grounded by the dent applies also to the cube. So if (b) is right it seems that, by parity of reasoning, we should say that the shape of the cube with a qualitatively identical dent would be explained in terms of the dent. But being nearly cubical is incompatible with being nearly spherical. So, according to the principle we are discussing, neither the shape of the ball nor that of the cube is explained in terms of the dent.

This goes to show that (Trans-P) is sensitive to wider debates about the logic of explanation and we should not expect these to be settled in the theory of grounding. Let us proceed to discuss (Trans-R). This can be fruitfully discussed even without deciding whether (Trans-P) is true.⁷

7.5.2 Relation transitivity

The first point to stress is that there is no supposition in favour of (Trans-R). Trans-R says, in effect, that whenever (i) we can metaphysically explain some fact about xx in terms of some fact about yy and (ii) we can metaphysically explain some fact about yy in terms of some fact about zz , then we can explain some fact about xx in terms of some fact about zz . This is not at all obviously correct. The parallel claim about ordinary explanation is implausible, as an everyday example shows. Suppose that Sophie did not attend the party because Zack was there and that Zack is angry because he argued with Ted; it does not follow that we can cite facts about Ted in any explanations of facts about Sophie – they may have never crossed paths.

Saying this does not commit us to denying that 'because' is transitive, in the sense that whenever it is the case that p because q and q because r , it follows that p because r . Although Zack features in explanations involving both Sophie and Ted, the facts about Zack that are cited in each case are different – there is no claim that figures as

⁵See the contrastive account of grounding offered by Schaffer forthcoming: sect. 4.3.

⁶The principle Salmon discusses is this: "if, on one occasion, the fact that circumstance of type C obtained is taken as a correct explanation of the fact that an event of type E occurred, then on another occasion, the fact that circumstance of type C obtained cannot correctly explain the fact that an event of type E' (incompatible with E) occurred" (Salmon 1998: 326). Salmon discusses problems for this principle based on indeterministic explanations, but these considerations seem not to apply to the analogous principle about of metaphysical explanation, which I assume is deterministic. Salmon endorses the principle for deterministic cases.

⁷For further discussion of the dented sphere case, see Trogdon forthcoming: sect. 3.

an explanans in the first explanation and explanandum in the second, through which a transitive chain of explanation could pass.

In fact, plausible counterexamples to (Trans-R) are not especially easy to find. Many central cases of grounding seem to validate (Trans-R). For instance, it is plausible that $\{Socrates\} \triangleleft Socrates$ and also that $Socrates \triangleleft a_1 \dots a_n$ (where $a_1 \dots a_n$ are Socrates' constituent atoms); and it is also, I think, plausible that $\{Socrates\} \triangleleft a \dots a_n$ – intuitively, we can explain the existence of $\{Socrates\}$ in terms of (the arrangement of) his atoms. In light of the difficulty in finding a clear counterexample to it, I am tempted to endorse (Trans-R).

7.5.3 Macro-reductions

It is worth discussing a speculative kind of counterexample to (Trans-R). These counterexamples rely on a principle that we can approach by recalling the treatment of mixed cases offered in chapter 5 (sect. 5.4). In mixed cases the properties of a certain object (or perhaps a plurality of objects) is explained by the *different* properties of *different* objects. Microreductions between properties give rise to paradigm mixed cases. For instance, suppose that the property having temperature T is identical with the property having parts with mean kinetic energy K . This gives rise to plausible grounding claims like:

The temperature of T of a sample of gas S is grounded by the fact that S 's constituent molecules $m_1 \dots m_n$ instantiate a determinate distribution of kinetic energy properties Z

I suggested in chapter 5 that mixed cases involve two distinct instances of grounding – one between the entities denoted at predicate position (in this case, $S \triangleleft m_1 \dots m_n$) and another between the properties involved (in this case, $T \triangleleft Z$).

That $S \triangleleft m_1 \dots m_n$ explains why facts about $m \dots m_n$ are relevant for explaining facts about S . You cannot explain facts about an object in terms of facts about just any distinct object – facts about the Moon are not explained by facts about a speck of dust on Alpha Centauri. Explanatory realists, who think that explanations track determination relations, will point out that there is no determination relation between the Moon and the speck, which is why facts about the one are not suitable for explaining fact about the other. This seems to be Ruben's point when he claims that “it is the presence of these ‘structural’ determinative (and dependency) relations that makes explanation possible (Ruben 1990: 210).

Applied to metaphysical explanations, this suggests the following thesis:

(Mediation) If facts about xx metaphysically explain facts about yy and xx are not identical with yy then xx ground yy .

The thought here is that grounding between distinct groups of entities xx and yy is needed to mediate metaphysical explanations of facts about yy in terms of facts about zz . (Mediation) seems plausible. It provides a plausible criterion for assessing metaphysical explanations and, in many cases, it gives the right results. It explains why, for instance, facts about $\{Socrates\}$ cannot be metaphysically explained in terms of facts about Plato. It is also based on a strong intuitive foundation. The intuition that Ruben voices is compelling and (Mediation) simply articulates that intuition as it applies to the case of metaphysical explanations. But (Mediation) has powerful results. It opens the door to potential counterexamples to (Trans-R), as we will now see.

It is arguable that not all mixed cases involve microreduction. Some plausible cases might be dubbed ‘macro reductions’: these are cases in which certain extrinsic properties of an object o are grounded by the properties of a wider system in which o is a part.

Consider the property of having weight W (five newtons, say). This property is extrinsic, since an object's weight depends on its own mass properties and also the gravitational relations it bears to distinct objects. Suppose that an object a is W , and this is explained by its having mass M and its bearing gravitational relation G to a nearby object b . The kind of explanation at issue here is not causal and it seems a good candidate for being a case of metaphysical explanation. We can put the grounding claim as follows:

The fact that a is W is metaphysically explained by the fact that a has mass M and that it bears gravitational relation G to b

According to this, a property of one object, a , is explained by the properties of distinct entities – namely, the pair of a and b (this pair is not identical with a – even though a is a member of that pair). Applying (Mediation) to this claim yields the claim that $a \triangleleft a, b$. This instance of grounding plays a similar role to the grounding relation between the sample of gas and its constituent molecules. It explains why facts about a and b taken together are relevant for explaining facts about a .

The claim that $a \triangleleft a, b$ seems odd. But it should not be rejected out of hand, given the plausibility of (Mediation). Moreover, it may be that we can explain the appearance of oddness away. I suspect that its appearance of oddness is partly explained by a tendency to mistakenly equate the claim that a is grounded by a and b with the implausible claim that a 's *existence* is grounded by a and b . On my view, these claims are not equivalent – a 's being grounded by b mediates explanations of a in terms of b , but it is neutral about the content of these explanations. Its oddness might also be explained by a general presupposition that all reductions are micro reductions. But this presupposition, if it is there, seems mistaken.

Let us return to (Trans-R). We have just seen some reason to think that $a \triangleleft a, b$. It is also plausible that $\{a\} \triangleleft a$ – this is an instance of the plausible claim that singleton sets are grounded by their members. But it is not plausible that $\{a\} \triangleleft a, b$. That is, there do not seem to be plausible metaphysical explanations of any facts about $\{a\}$ in terms of facts about the pair a, b – in which case this is a violation of (Trans-R).

The following explanation might be proposed, in defence of (Trans-R): $\{a\}$ has a member which is W because a has mass M and bears G to b . But this is, I think, spurious. To bring out the steps involved in this claim, we should expand it into the following:

$\{a\}$ has a member that is W because a is W ; a is W because a is M and G related to b

The first of these claims is an instance of the pattern 'There is some F because a is F '. I argued above (chapter 2: sect. 2.3) that claims of this form are not explanatory (they are more plausibly viewed as using 'because' evidentially). The claim that $\{a\}$ has a member which is W because a has mass M and bears G to b is a spurious contraction of a hybrid explanatory-evidential claim – spurious because it features an equivocal occurrence of 'because'. On this diagnosis, the proposed explanation is analogous to the erroneous contraction: Elijah is by the bank (financial institution) and Ezekiel is by the bank (river's edge); so Elijah and Ezekiel are by the bank.

In sum, then, (Mediation) generates problems for (Trans-R). We will see in the next section that (Mediation) has consequences for the question of grounding's irreflexivity as well.

7.6 Irreflexivity

To say that grounding is irreflexive is to say that nothing grounds itself. This claim is endorsed by many participants in the debate (Audi forthcoming a; forthcoming b; Correia

2008: 1023; Fine 2001: 15; McLaughlin and Bennett 2005: sect. 3.5; Rosen 2010: 115; Schaffer 2009: 364; for dissent, see Jenkins 2011 and Lowe 1998: 145).

Contrast the following two irreflexivity claims:

$$(\text{Irreflexivity-P}) \sim \Sigma xx (xx \blacktriangleleft xx)$$

$$(\text{Irreflexivity-R}) \sim \exists xx (xx \triangleleft xx)$$

(Irreflexivity-P) says that there is no assignment $\ulcorner xx \urcorner$ such that $xx \blacktriangleleft xx$. That is, there is no true grounding claim with a single assignment flanking the grounding predicate. (Irreflexivity-P) is the claim that the predicate ' \blacktriangleleft ' is irreflexive. (Irreflexivity-R) is the claim that the grounding relation is irreflexive.

It is consistent with (Irreflexivity-P) that (Irreflexivity-R) is false. That is, it is consistent with (Irreflexivity-P) that the following existential generalization is witnessed:

$$\exists xx (xx \triangleleft xx)$$

Assignments can be coextensive without being identical (otherwise there would be nothing gained by using assignments). So there may be grounding claims that witness the truth of this generalization without being counterexamples to (Irreflexivity-P). But it is not consistent with (Irreflexivity-R) that (Irreflexivity-P) is false. Any counterexample to (Irreflexivity-P) is automatically a counterexample to (Irreflexivity-R), because assignments are identical only if they are satisfied by the same entities (this is one of the assumptions about assignment individuation that I made in chapter 6: sect. 6.4). In this sense (Irreflexivity-P) is weaker than (Irreflexivity-R).

7.6.1 Predicate irreflexivity

The question of whether (Irreflexivity-P) holds turns, in large part, on the question of whether metaphysical explanation is irreflexive. Any counterexample to (Irreflexivity-P) would, in conjunction with (G-exp), entail a counterexample to the claim that metaphysical explanation is irreflexive. So any reason to believe that metaphysical explanation is irreflexive is also a reason to believe (Irreflexivity-P). I take it that there is good intuitive reason to think that metaphysical explanation *is* irreflexive, which constitutes good reason to treat (Irreflexivity-P) as a plausible default view.

7.6.2 Relation irreflexivity

A counterexample to (Irreflexivity-R) would be a true grounding claim in which coextensive assignments flank ' \blacktriangleleft '; that is, a grounding claim of the form:

$$a_1 \dots a_n^\varphi \blacktriangleleft a_1 \dots a_n^\psi$$

Application of (G-exp) to a sentence of this form yields a sentence of the form

$$\varphi a_1 \dots a_n \text{ because } \psi a_1 \dots a_n$$

A sentence of this form will not be a counterexample to (Irreflexivity-P) as long as ' φ ' and ' ψ ' are replaced by predicates standing for different properties, since in that case the assignments will be distinct (see chapter 6: sect. 6.4). As a result, the plausibility of (Irreflexivity-P) provides no support to (Irreflexivity-R). Moreover, there does not seem to be any other plausible thesis about explanation that supports it. The following principle would, if true, support (Irreflexivity-R):

$$\sim \varphi a_1 \dots a_n \text{ because } \psi a_1 \dots a_n$$

But this is very implausible. There are plausible explanations – including non-causal, metaphysical explanations of the kind that grounding theorists are concerned with – of the form ‘ a is F because a is G ’:

- (A) The ball is red because it is scarlet.
- (B) The action is wrong because it causes unnecessary suffering.
- (C) The diamond is hard because it contains atoms arranged in a regular crystalline structure.

These examples show that a ban on explanations of the above form, even one restricted to metaphysical explanations, would be implausible. There do not seem to be obvious and plausible claims about explanation that support (Irreflexivity-R).

Nonetheless, (Irreflexivity-R) may be supported by considering examples, for it is notable that it is difficult to produce a clear counterexample to it. Putative counterexamples include the grounding claims corresponding to explanations like (A)-(C):

- (A*) The ball’s redness is grounded by its scarletness.
- (B*) The fact that the action is wrong is grounded by the fact that it causes unnecessary suffering.
- (C*) The fact that the diamond is hard is grounded by the fact that it contains atoms arranged in a regular crystalline structure.

In each of these claims an entity’s properties are said to be grounded by other properties of the same entity. These claims are among the central intuitive cases that grounding theorists discuss so we should not simply reject them. How should they be regimented? Let us focus on (A*) (there seems no need to discuss (B*) and (C*) separately).

It is quite natural to suggest the following regimentation for (A*):

$$(A+) \textit{Ball}^{Is\ red} \blacktriangleleft \textit{Ball}^{Is\ scarlet}$$

(A+) is inconsistent with (Irreflexivity-R) because the assignments ‘ $\textit{Ball}^{Is\ Red}$ ’ and ‘ $\textit{Ball}^{Is\ Scarlet}$ ’ are coextensive. So part of deciding the plausibility of (Irreflexivity-R) is deciding whether (A+) is the correct regimentation for (A*). The moral of chapter 5 sect. 5.4 is that grounding sometimes relates properties and, in fact, there is reason to understand (A*) as an instance of this. That is, there is reason to favour (A++) over (A+):

$$(A++) \textit{Redness}^{Instantiated\ by\ Ball} \blacktriangleleft \textit{Scarletness}^{Instantiated\ by\ Ball}$$

(A++) is consistent (Irreflexivity-R), because the assignment ‘ $\textit{Redness}^{Instantiated\ by\ Ball}$ ’ is not coextensive with ‘ $\textit{Scarletness}^{Instantiated\ by\ Ball}$ ’, since Redness and Scarletness are distinct properties.

Why should we favour (A++)? According to the methodology for regimentation sketched in the previous chapter, we decide issues of regimentation only after we have arrived at an account of what grounds what. So before we ask how to regiment (A*) we need to decide whether redness and scarletness stand in the grounding relation or whether Ball stands in that relation to itself.

We postulate grounding to explain explanatory phenomena, including explanatory asymmetries (why is Ball’s redness explained in terms of its scarletness and not vice versa?) and explanatory generalizations (why, in general, are scarlet things red because they are scarlet?). A grounding relation between the properties, redness and scarletness, would underpin a host of explanations of redness in terms of scarletness, because it

concerns properties rather than particulars, and so applies wherever these properties are instantiated.

A grounding relation between ball and itself would not explain why Ball's redness is explained in terms of its scarletness and not vice versa; for the fact that ball is grounded by itself does not have the kind of directionality that an explanation of this explanatory asymmetry would need. Furthermore, because it is a fact about a particular entity, it would explain why the redness of other entities can be explained in terms of their scarletness.

(A*), and by similar reasoning (B*) and (C*), do not constitute promising counterexamples to (Irreflexivity-R). Until we are provided with other candidate counterexamples, we can take (Irreflexivity-R) to be a substantive but plausible thesis.⁸

Consider now a stronger irreflexivity claim:

$$(\text{Irreflexivity+}) \sim \exists xx (xx \triangleleft xx)$$

(Irreflexivity+) is the claim that there are no entities xx that are among some entities yy that transparently ground xx . That is, there are no entities xx that exhaust an assignment $\lceil ss \rceil$ and satisfy an assignment $\lceil tt \rceil$, such that $ss \blacktriangleleft tt$. That is: no entities are among their own grounds.

One might be tempted to endorse (Irreflexivity+) as a result of plausible analogues in the theory of explanation. As Hempel (1965a: 274) points out, we are pre-theoretically inclined to deny that any proposition can partly explain itself. And we might think that such intuitions might support one or other of these irreflexivity claims. But the connection between explanation and these concepts of partial grounding is unclear. The point of introducing the concept of transparent grounding is to 'abstract' the relata of grounding out of the assignments that figure in our fundamental account of what grounds what. By doing this we undermine the connection between grounding and explanation, because the principle that describes this connection – (G-exp) – depends on the use of assignments in grounding claims. It is therefore difficult to see the relevance of intuitions about explanation for issues about transparent grounding.

On the other hand, it is unclear how we could define a notion of partial grounding that is satisfied by assignments. The concepts that we would expect to use in a definition of partial grounding – concepts of *part-hood* and the *among* relation – do not seem applicable. There is not, for instance, any clear sense in which an assignment can be part of another assignment. An assignment can be among a plurality of assignments; but ' \blacktriangleleft ' only ever takes one assignment on either side, so this concept does not seem to be of use here.

A counterexample to (Irreflexivity+) would be a case in which some entities xx are transparently grounded by some other entities yy , such that xx is (are) among yy . We have already encountered a possible case. Application of (Mediation) to the claim that a 's weight W is grounded by a 's mass and the gravitational relation a bears to b yields the claim that $a \triangleleft a, b$. (Mediation) provides a speculative but principled reason to reject (Irreflexivity+).

7.7 Asymmetry

Intuitively, to say that grounding is asymmetric is to say that there is no mutual grounding. Many grounding theorists take grounding to be asymmetric. Rosen argues for this

⁸Note that if the ontological free lunch doctrine (see chapter 4) is going to give us clear methodological guidance, we need a clear partition of fundamentals into non-fundamentals. If some things ground themselves and nothing else grounds them, would they count as fundamental? It is not clear. Nor is it clear whether we should want to count such entities as ontological free lunches. So if there are violations of (Irreflexivity-R), we may need to rethink the definition of fundamentality we gave in chapter 4 sect. 4.1.

claim as follows:

The thought is that when we cite grounds for $[p]$, we cite facts that are strictly prior to $[p]$ in a certain explanatory order. If $[q]$ plays a role in making it the case that p , then $[q]$ must be ‘more fundamental’ than $[p]$, in which case $[p]$ cannot play a role in making it the case that q (Rosen 2010: 116).

This account of grounding’s asymmetry assumes the fact theory but dimensioned theorists could offer a similar argument. We can say that the grounds for an entity (not necessarily a fact) a are those objects that are strictly prior to a in an explanatory order. Given this ordering, it seems that these objects cannot, in turn, be grounded by a for then it is difficult to see any sense in which they are strictly prior to a (see also Audi forthcoming; Schaffer 2009: 364;).

Again, for us there are several claims in the vicinity. The first is the following claim,

$$\text{(Asymmetry-P)} \sim \Sigma xx \Sigma yy (xx \triangleleft yy \wedge yy \triangleleft xx)$$

(Asymmetry-P) seems very plausible. Its plausibility derives from the fact that explanation is plausibly asymmetric, in the sense that all instances of the following schema are true,

$$\text{(Asymmetry-exp)} \sim (p \text{ because } q \text{ and } q \text{ because } p)$$

Any counterexample to (Asymmetry-P) would, in conjunction with (G-exp), entail a counterexample to (Asymmetry-exp), so the plausibility of (Asymmetry-exp) passes over to (Asymmetry-P). Since I take it there is good intuitive reason to believe (Asymmetry-exp) I will endorse (Asymmetry-P) as well.

The claim that the grounding relation is asymmetric is as follows:

$$\text{(Asymmetry-R)} \sim \exists xx \exists yy (xx \triangleleft yy \wedge yy \triangleleft xx)$$

Note that the falsity of (Asymmetry-R) is consistent with the truth of (Asymmetry-P); therefore the plausibility of (Asymmetry-P) does not support (Asymmetry-R). Again, plausible counterexamples to (Asymmetry-R) are not easy to come by, and it is very tempting to endorse it. But again (Mediation) generates problem cases for (Asymmetry-R). Suppose priority monism is true: there is exactly one fundamental entity, the whole universe (Schaffer 2010). Everything else is grounded by the whole. That is, where ‘ U ’ denotes the whole universe,

$$\forall xx (xx \neq U \rightarrow xx \triangleleft U)$$

For instance, where $a_1 \dots a_n$ every atom in the universe,

$$\text{(PM)} a_1 \dots a_n \triangleleft U$$

We should not rule out that some of U ’s properties depend on those of its parts. For instance, it might have the property of having an average temperature of 10 K. It is prima facie plausible that the fact that the universe has this average temperature can be metaphysically explained in terms of the properties of its parts (given that temperature properties microreduce to mean kinetic energies of molecules). But (Mediation) would then imply that U is grounded by its parts. That is,

$$\text{(Con-PM)} U \triangleleft a_1 \dots a_n$$

The conjunction of (PM) and (Con-PM) constitutes a counterexample to (Asymmetry-R).

7.8 Summary and conclusion

In this chapter we have seen that it is important for the dimensioned theorists to distinguish their account of the grounding relation from their account of the grounding predicate. I hope it is clear that the logic of the grounding relation is only indirectly related to that of explanation and the grounding predicate. Settling questions about the logical properties of the grounding relation is not straightforward, since intuitions about explanation bear only indirectly on these questions.

Furthermore, we have seen that (Mediation) generates problems for certain transitivity and irreflexivity claims. Our discussion of (Mediation) has been all too brief. I think that (Mediation) is an interesting thesis since it is both plausible and has powerful results: it warrants more discussion than I have given it here. Given that it seems so closely allied to the intuitions that motivate explanatory realism, grounding theorists should think hard about rejecting it. But we have seen that it gives rise to counterexamples to various *prima facie* plausible claims in the logic of grounding.

Wrapping up

Let us review our findings. We saw in chapter 2 that as long as we conceive of grounding relationally, and give the relation of grounding ontological roles to play, we can analyse the concept of grounding contextually in the manner of Lewis (1970). This provides a way to analyse grounding in terms of antecedently intelligible concepts, allowing us to respond to sceptics who deny the intelligibility of grounding. This requires us to think hard about the explanatory roles that the grounding relation can play.

These were discussed in chapter 3. We saw that introducing grounding relations into our ontology allows for candidate explanations of instances of supervenience; of non-causal explanatory phenomena; and it systematises our account of the determination relations, by providing an ontological basis for explaining why these relations share the properties they do (for instance, being explanatory and non-contingent).

In chapter 4 I defended the view that a theory's account of what grounds what partially determines its theoretical economy, hence the degree to which it warrants belief. On the view defended in there, grounded entities come for free in the sense that including them in our ontology tends not to negatively affect the explanatory structure of our overall theory. We also saw that it is not plausible to maintain, as Ross Cameron and Jonathan Schaffer do, that grounded entities come for free in the sense that Occam's razor does not apply to them.

In chapter 5 I argued that the fact theory does not describe a relation that is suitable for playing some of grounding's ontological roles (in the theory of explanation and in the theory of the determination relations). We therefore embraced the dimensioned theory instead. In chapter 6 I outlined a way of developing this theory that solves the serious problems that afflict it – namely, that it seems difficult for dimensioned theorists to specify the relation between grounding and explanation, and likewise the relation between grounding and metaphysical necessity. And in the last chapter we discussed some of the formal properties of grounding.

I will close by commenting on two issues about the wider significance of our discussion. In chapter 5 I argued that the fact theory is implausible. The argument presupposed the account of grounding's roles outlined in chapter 3. Given this account of grounding's roles, the connective theory hardly gets a look in. The theoretical roles that we have given grounding are ontological roles for the grounding relation and, once we have abandoned the idea that ontological neutrality is a desideratum in the theory of grounding, it is unclear what reason there is for endorsing the connective theory – its *raison d'être* seems to be to avoid ontological commitment to the grounding relation.

It does not follow from our discussion that the fact theory or the connective theory should be rejected. For all I have said, there might be other theoretical roles that fact theorists and connective theorists can appeal to, in order to motivate their views. Therefore it may turn out that we should recognise more than one kind of grounding – a dimensioned-theoretic kind of grounding for some roles and a fact-theoretic or connective-theoretic kind of grounding for others. This is an avenue for fact theorists and connective theorists to pursue.

Even if no compelling motivation for the fact theory or the connective theory is forthcoming, this would not detract from the interest and importance of similar theories of the *ordinary* concept of explanation. Benjamin Schnieder's discussion of the logic of the ordinary English connective 'because' (Schnieder 2011) is in some ways similar to the accounts of grounding offered by Fabrice Correia (2010) and Kit Fine (forthcoming a). The key difference is that Schnieder, unlike Correia and Fine, does not introduce a technical concept of metaphysical explanation. Schnieder does not face the challenge of elucidating, and motivating the introduction of, a new concept.

The second issue I want to comment on is the significance of our discussion for the debate about truthmaker theory. There is a growing trend in the debate about truthmaking to construe truthmaking as a special case of grounding (see, e.g., Rodriguez-Pereyra 2005). The account of grounding developed in chapters 5 and 6 is consistent with the idea that the truthmaking relation is a special case of the grounding relation. For on our account grounding can relate entities from different ontological categories, just as truthmaking does. By contrast, the fact theory is inconsistent with the thesis that truthmaking is a special case of grounding, since the truthmaking relation does not hold between facts (see Liggins forthcoming).

Lewis's 2003 account of truthmaking has not been well received and it is under-discussed. One possible reason that Lewis's theory has not received the attention it deserves is that it is a modal analysis of truthmaking and suffers from the general problems that beset modal analyses of explanatory concepts (see chapter 1: sect. 1.3.4).

I think that those who are tempted by Lewis's theory would do well to give up on the idea that it provides a modal analysis of truthmaking. This was never the main selling point of Lewis's theory. The main selling point is that it provides a way to avoid postulating states of affairs as truthmakers. This aspect of the theory survives even if we drop the idea that we can give a modal analysis of truthmaking. We can believe in a primitive concept of grounding (or truthmaking, if you prefer) while still using assignments to denote the relata of this relation, in the manner outlined in chapter 6. The ability of Lewis's theory to rid us of commitment to states of affairs has nothing to do with its status as a modal analysis of truthmaking. Truthmaker theorists who reject Lewis's theory because it is just another modal analysis of truthmaking should think again.

Lewis's 2003 treatment of truthmaking provides the materials for an effective and general strategy for avoiding commitment to an ontology of states of affairs. I have illustrated how the strategy can be implemented in the theory of grounding. There is, I think, reason to hope that the strategy might fruitfully be pursued to avoid commitment to states of affairs in other debates as well. Such applications of the theory deserve further exploration.

Bibliography

- Aristotle. 1984. "Categories". In *The Complete Works of Aristotle: The Revised Oxford Translation, vol. 1*, ed. Jonathan Barnes: 3-24. Princeton University Press.
- Armstrong, D. 1997. *A World of States of Affairs*. Cambridge University Press.
- Audi, P. forthcoming a. "A clarification and defence of the notion of grounding". In *Metaphysical Grounding: Understanding the Structure of Reality*, eds. F. Correia and B. Schnieder. Cambridge: Cambridge University Press.
- Audi, P. forthcoming b. "Grounding: towards a theory of the in-virtue-of relation". *Journal of Philosophy*.
- Ayer, A. 1936. *Language Truth and Logic*. London: Gollancz.
- Bennett, K. 2011a. "Construction area (no hard hat required)". *Philosophical Studies* 154: 79–104.
- Bennett, K. 2011b. "By our bootstraps". *Philosophical Perspectives* 25: 27-41.
- Bolzano, B. 1972. *Theory of Science*, ed. and trans. Rolf George. Berkeley-Los Angeles: University of California Press.
- Boolos, G. "To be is to be a value of a variable (or to be some values of some variables)". *The Journal of Philosophy* 81: 430-449
- Bricker, P. 2006. "The relation between general and particular: Entailment vs. supervenience". In *Oxford Studies in Metaphysics, vol. 2*, ed. D. Zimmerman: 251-88. Oxford.
- Bromberger, S. 1966. "Why questions". In *Mind and Cosmos: Essays in Contemporary Science and Philosophy*, ed. R. Colodny: 68-111. Pittsburgh: University of Pittsburgh Press.
- Burgess J. and Rosen, G. 1997. *A Subject With No Object*. Oxford: Clarendon.
- Cameron, R. 2008. "How to be a truthmaker maximalist". *Noûs* 42: 410–421.
- Cameron, R. 2010a. "How to have a radically minimal ontology". *Philosophical*

- Studies* 151: 249-264.
- Cameron, R. 2010b. "Quantification, naturalness and ontology". In *New Waves in Metaphysics*, ed. A. Hazlett: 8-26. Palgrave Macmillan.
- Carnap, R. 1956. "The methodological character of theoretical concepts". In *Minnesota studies in the philosophy of science, vol. 1*, eds. H. Feigl & M. Scriven: 38-76. Minneapolis: University of Minnesota Press.
- Clark, M. and Liggins, D. forthcoming. "Recent work on grounding". *Analysis Reviews*.
- Correia 2004 "Husserl on Foundation" *Dialectica* 58: 349–367.
- Correia, F. 2005. *Existential Dependence and Cognate Notions*. Philosophia Verlag.
- Correia 2010 "Grounding and the truth functions". *Logique et Analyse* 53: 251–79.
- Daly, C. 2005. "So where's the explanation?". In *Truthmakers: The Contemporary Debate*, eds. H. Beebe and J. Dodd: 85 - 105. Oxford: Clarendon.
- Daly, C. forthcoming. "Scepticism about grounding". In *Metaphysical Grounding: Understanding the Structure of Reality*, eds. F. Correia and B. Schnieder. Cambridge: Cambridge University Press.
- Dancy, J. 1981 "On Moral Properties". *Mind* 90: 367-385.
- Dasgupta, S. manuscript. "On the plurality of grounds".
- David, M. 2005. "Armstrong on truthmaking". In *Truthmakers: The Contemporary Debate*, eds. H. Beebe and J. Dodd: 141-60. Oxford: Clarendon.
- deRosset, L. 2010. "Getting priority straight". *Philosophical Studies* 149: 73–97.
- Divers, J. 1999. "A genuine realist theory of advanced modalising". *Mind* 108: 217–239.
- Divers, J. 2002. *Possible Worlds*. London: Routledge.
- Divers 2007 "Quinean scepticism about de re modality after David Lewis". *European Journal of Philosophy* 14: 40-62.
- Dodd, J. 2007. "Negative truths and truthmaker principles". *Synthese* 156: 383-401.
- Fara, M. 2006. "Dispositions". In *The Stanford Encyclopedia of Philosophy (Fall 2006 Edition)*, ed. E. Zalta. <http://plato.stanford.edu/archives/fall2006/entries/disposition>

- Fine, K. 2001. "The question of realism". *Philosophers Imprint* 1: 1-30.
- Fine, K. 2010 "Some puzzles of ground". *Notre Dame Journal of Formal Logic* 51: 97-118.
- Fine, K. forthcoming a. "A guide to ground". In *Metaphysical Grounding: Understanding the Structure of Reality*, eds. F. Correia and B. Schnieder. Cambridge: Cambridge University Press.
- Fine, K. forthcoming b. "The pure logic of ground". In *Review of Symbolic Logic*.
- Forrest, P. 2001. "Counting the cost of modal realism". In *Reality and Humean Supervenience*, eds. G. Preyer and F. Siebelt: 93 - 103. Rowman and Littlefield.
- Forrest, P. 2009. "Razor arguments". In *The Routledge Companion to Metaphysics*, eds. R. Cameron, A. McGonigal, R. le Poidevin and P. Simons: 246-255. Routledge.
- Friedman, M. 1974. "Explanation and scientific understanding". *The Journal of Philosophy* 71: 5-19.
- Funkhouser, E. 2006. "The determinable-determinate relation". *Noûs* 40: 548-569.
- Goodman, N. 1954. *Fact, Fiction and Forecast*. Cambridge, Mass.: Harvard University Press.
- Gregory, D. 2001. "Smith on truthmakers" *European Journal of Philosophy*, 14 (3): 40-62.
- Hausman, D. 1998. *Causal Asymmetries*. Cambridge: Cambridge University Press.
- Hempel, C. 1965a. "Aspects of scientific explanation". In his *Aspects of Scientific Explanation*: 331-496. New York: Free Press:
- Hempel, C. 1965b. "The theoretician's dilemma". In his *Aspects of Scientific Explanation*: 173-226. New York: Free Press.
- Hofweber, T. 2009. "Ambitious, yet modest, metaphysics" in *Metametaphysics: New Essays on the Foundations of Ontology*, eds. D. Chalmers, D. Manley and R. Wasserman: 260-289. Oxford: Oxford University Press.
- Horgan, T. 1993. "From supervenience to superdupervenience: Meeting the demands of a material world". *Mind*, 102: 555-86.
- Hudson, H. 2005. *The Metaphysics of Hyperspace*. Oxford University Press.
- Husserl, E. 2001. *Logical Investigations vol. 2*. London & New York: Rout-

ledge.

Incurvati, L. forthcoming. "How to be a Minimalist about Sets" *Philosophical Studies*.

Jackson, F. 1998. *From Metaphysics to Ethics: a Defence of Conceptual Analysis*. Oxford University Press.

Jenkins, C. 2011. "Is metaphysical dependence irreflexive?" *The Monist*. References are to the version available at <http://www.carriejenkins.co.uk/research/papers>

Kim, J. 1974. "Noncausal connections". *Noûs* 8: 41-52.

Kim 1993. "Postscript to supervenience" in his *Supervenience and Mind: Selected Philosophical Essays*: 161-74. Cambridge University Press.

Kim, J. 1994. "Explanatory knowledge and metaphysical dependence". *Philosophical Issues* 5: 51-69.

Kim, J. 2002. "The layered model: Metaphysical considerations". *Philosophical Explorations: An International Journal for the Philosophy of Mind and Action*, 5: 2-20.

Kitcher, P. 1981. "Explanatory unification". *Philosophy of Science*, 48 (4): 507-531.

Kitcher, P. 1989. "Explanatory unification and the causal structure of the world". In *Scientific Explanation*, eds. P. Kitcher and W. Salmon: 410-505. Minneapolis: University of Minnesota Press.

Koslicki, K. forthcoming "Varieties of ontological dependence". In *Metaphysical Grounding: Understanding the Structure of Reality*, eds. F. Correia and B. Schnieder. Cambridge: Cambridge University Press.

Kripke, S 1980. *Naming and Necessity*. Cambridge, MA: Harvard University Press.

Künne 2003 *Conceptions of Truth*. Oxford: Clarendon.

Leibniz, G. 2008 *Discourse on Metaphysics*.

LePore, E & Loewer, B. 1989. "More on making mind matter". *Philosophical Topics* 17: 175-91.

Levin, J. 2010. "Functionalism". The Stanford Encyclopedia of Philosophy (Summer 2010 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/sum>

Lewis 1970. "How to define theoretical terms". *The Journal of Philosophy* 67: 427-446.

Lewis 1971. "Counterparts of persons and their bodies". *Journal of Philosophy* 68: 203-211 .

- Lewis, D. 1973. *Counterfactuals*. Blackwell.
- Lewis 1979. "General semantics". *Synthese* 22: 18-67.
- Lewis, D. 1983. "New work for a theory of universals". *Australasian Journal of Philosophy* 61: 343-377.
- Lewis, D. 1986a. *On the Plurality of Worlds*. Blackwell.
- Lewis, D. 1986b. "Causal explanations" in his *Philosophical Papers Vol. 2*: 214-40. New York: Oxford University Press.
- Lewis 1992. "Critical notice of David Armstrong, *A Combinatorial Theory of Possibility*". *Australasian Journal of Philosophy* 70: 211-224.
- Lewis, D. 1997. "Naming the colours". *Australasian Journal of Philosophy*, 75(3): 325-342.
- Lewis 2003 "Things qua truthmakers". In *Real Metaphysics: Essays in Honour of D. H. Mellor*, eds. H. Lillehammer and G. Rodriguez-Pereyra: 25-38. London and New York: Routledge.
- Lewis and Rosen 2003 "Postscript to *Things qua truthmakers*". In *Real Metaphysics: Essays in Honour of D. H. Mellor*, eds. H. Lillehammer and G. Rodriguez-Pereyra: 39-42. London and New York: Routledge.
- Liggins, D. forthcoming. "Truthmakers and dependence". In *Metaphysical Grounding: Understanding the Structure of Reality*, eds. F. Correia & B. Schnieder. Cambridge University Press.
- Lowe, E. 1994. "Ontological dependency". *Philosophical Papers* 23: 31-48.
- Lowe, E. 1998. *The Possibility of Metaphysics*. Oxford: Oxford University Press.
- MacBride, F. 2005. "Lewis's animadversions on the truthmaker principle". In H. Beebe and J. Dodd eds. *Truthmakers: The Contemporary Debate*: 117-40. Oxford: Clarendon.
- McDermott, M. 1995: "Redundant causation". *British Journal for the Philosophy of Science*, 40: 523-544.
- McLaughlin, B. and Bennett, K. 2005. "Supervenience". In *The Stanford Encyclopedia of Philosophy (Winter 2011 Edition)*, ed. E. Zalta <<http://plato.stanford.edu/archives/win2011/entries/supervenience/>>.
- Melia, J. 2005. "Truthmaking without truthmakers" in *Truthmakers: The Contemporary Debate*, eds. H. Beebe and J. Dodd: 67-84. Oxford: Clarendon.
- Menzies, P. 2008. "Counterfactual Theories of Causation". In *The Stanford Encyclopedia of Philosophy (Fall 2009 Edition)*, ed. E. Zalta

<<http://plato.stanford.edu/archives/fall2009/entries/causation-counterfactual/>>.

- Moore, G. 1953. *Some Main Problems in Philosophy*. London: Allen and Unwin.
- Morreall, J. 1979 “The evidential use of *because*”. *Papers in Linguistics* 12: 231–38.
- Morris, K. 2010. “Guidelines for theorizing about realization”. *The Southern Journal of Philosophy* 48: 393–416.
- Nolan, D. 2008. “Truthmakers and predication”. *Oxford Studies in Metaphysics* 4: 171–192.
- Oliver, A. 1996. “The metaphysics of properties”. *Mind* 105: 1–80.
- Plato. 1961. “Euthyphro”. In *The Collected Dialogues of Plato*, eds. E. Hamilton and H. Cairns: 169–85. Princeton University Press.
- Quine, W. 1956. “Quantifiers and Propositional Attitudes”. *Journal of Philosophy* 53: 177–87.
- Quine, W. 1963a. “On what there is”. In his *From a Logical Point of View*: 1–19. Harper & Row.
- Quine, W. 1963b. “Reference and modality”. In his *From a Logical Point of View*: 139–159. Harper & Row.
- Quine, W. 1960. *Word and Object*. Cambridge: MIT.
- Raven, M. forthcoming. “In defence of ground”. *Australasian Journal of Philosophy*.
- Rodriguez-Pereyra, G. 2005. “Why truthmakers?” in *Truthmakers: The Contemporary Debate*, eds. H. Beebe and J. Dodd: 17–31. Oxford: Clarendon.
- Rodriguez-Pereyra, G. 2006. “Truthmaking, entailment, and the conjunction thesis”. *Mind* 115: 957–81.
- Rosen, G. 2010. “Metaphysical dependence: Grounding and reduction” in *Modality: Metaphysics, Logic and Epistemology*, eds. B. Hale and A. Hoffman: 109–137. Oxford: Oxford University Press.
- Ruben, D. 1990. *Explaining Explanation*. Routledge.
- Russell, B. 1956. “The philosophy of logical Atomism”. In his *Logic and Knowledge*. London: Allen and Unwin: 177–281.
- Salmon, W. 1998. *Causality and Explanation*. Oxford University Press.
- Schaffer, J. 2009. “On What Grounds What” in David Chalmers and David Manley eds. *Metametaphysics*, Oxford.

- Schaffer, J. 2010. "Monism: The priority of the whole". *The Philosophical Review* 119: 31–76.
- Schaffer, J. forthcoming. "Grounding, transitivity, and contrastivity". In *Metaphysical Grounding: Understanding the Structure of Reality*, eds. F. Correia and B. Schnieder. Cambridge: Cambridge University Press.
- Schaffer, J. manuscript. "Grounding as the primitive concept of metaphysical structure".
- Schiffer, S. 1987. *Remnants of Meaning*. Cambridge, Massachusetts: MIT Press.
- Schnieder, B. 2006a. "Truth-making without truth-makers". *Synthese* 152 (1). 21-46.
- Schnieder, B. 2006b. "A certain kind of trinity: Dependence, substance, explanation". *Philosophical Studies* 129: 393–419.
- Schnieder, B. 2010. "A puzzle about 'because'". *Logique et Analyse* 211: 317–43.
- Schnieder, B. 2011. "A logic for 'because'". *Review of Symbolic Logic* 4: 445–65.
- Schulte, P. forthcoming. "Can truthmaker theorists claim ontological free lunches?" *European Journal of Philosophy*.
- Shoemaker 1980 "Causality and properties". In *Time and Cause*, ed. P. van Inwagen: 109-35. Dordrecht: D. Reidel Publishing Company.
- Sibley, F. 1959. "Aesthetic concepts". *The Philosophical Review* 68: 421-450.
- Sider, T. 2011. *Writing the Book of the World*. Oxford: Oxford University Press.
- Stoljar D. 2009. "Physicalism". In *The Stanford Encyclopedia of Philosophy (Fall 2009 Edition)*, ed. E. Zalta. <http://plato.stanford.edu/archives/fall2009/entries/physicalism/>.
- Strawson, P. 1950. "Truth". *Proceedings of the Aristotelian Society* 24: 129-156.
- Tatzel, A. 2002. "Bolzano's theory of ground and consequence". *Notre Dame Journal of Formal Logic* 43: 1-25.
- Thompson, J. 1983. "Parthood and identity across time". *The Journal of Philosophy* 80: 201-220.
- Trogon, K. forthcoming. "An introduction to grounding". In *Ontological Dependence, Supervenience, and Response-Dependence*, eds. M. Hoeltje, B. Schnieder and A. Steinberg. Munich: Philosophia.

- van Fraassen, B. 1980. *The Scientific Image*. Oxford: Oxford University Press.
- van Inwagen, P. 1981. "Why I don't understand substitutional quantification". *Philosophical Studies* 39: 281-285.
- Wieland, J. and Weber, E. 2010. "Metaphysical explanatory asymmetries". *Logique and Analyse* 53: 345-365.
- Williamson, T. 2007. *The Philosophy of Philosophy*. Oxford: Blackwell.
- Whitcomb, D. forthcoming. "Grounding and omniscience". In *Oxford Studies in Philosophy of Religion Vol. 4*, ed. J. Kvanvig. Oxford University Press.
- Wilson, J. 2009. "Determination, realization and mental causation". *Philosophical Studies* 145: 149-169
- Wilson, J. 2010. "What is Hume's Dictum, and Why Believe It?". *Philosophy and Phenomenological Research* 80 (3): 595-637.
- Witmer, G., Butchard, W. and Trogdon, K. 2005. "Intrinsicity without naturalness". *Philosophy and Phenomenological Research* 70: 326-50.
- Zangwill, N. 1997. "Explaining supervenience: moral and mental". *Journal of Philosophical Research* 22: 509-518.